Implementing and Testing a Web Application Firewall (WAF) – praktični dio

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Kolegij: Sigurnost informacijskih sustava

Akademska godina: 2025./2026.

Sadržaj

Cilj projekta

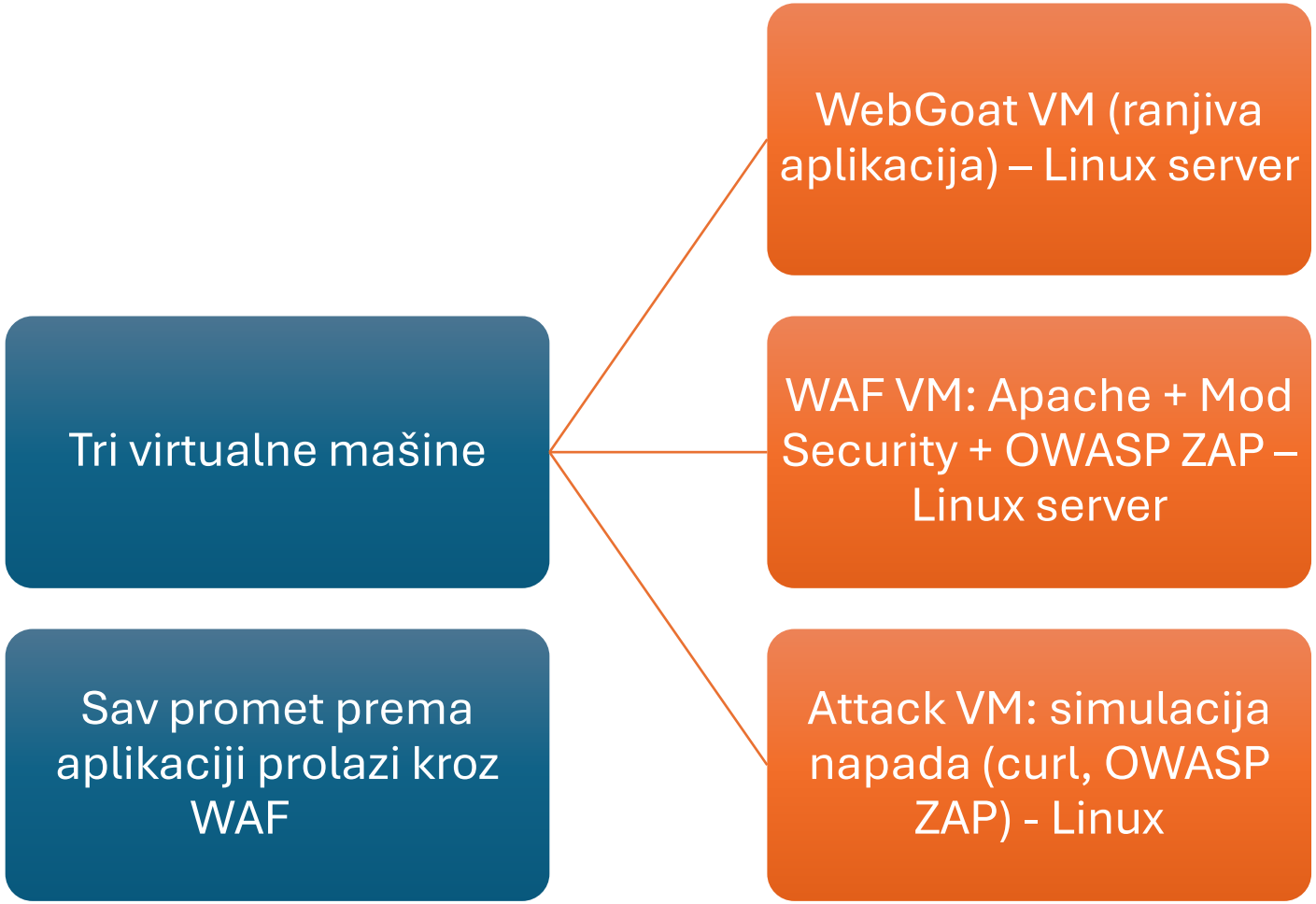
Implementirati WAF koristeći Apache + ModSecurity + OWASP CRS

Postaviti izolirano testno okruženje

Testirati reakciju WAF-a na zlonamjerne zahtjeve

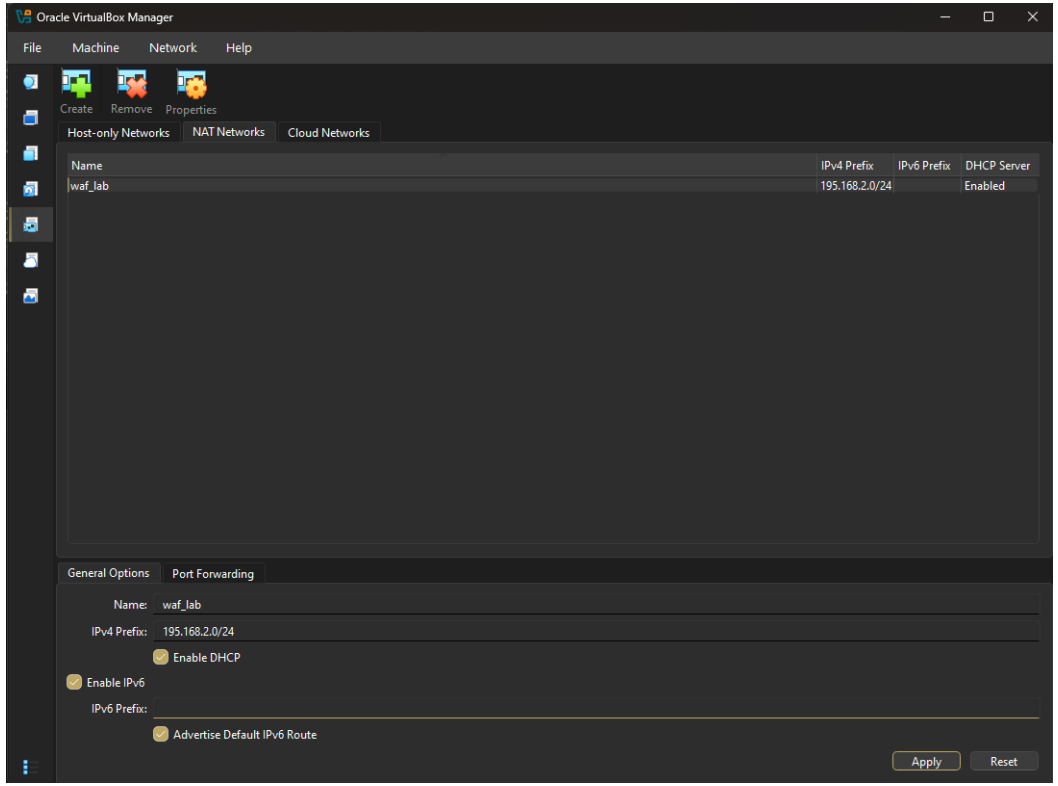
Usporediti ponašanje sustava sa i bez WAF-a

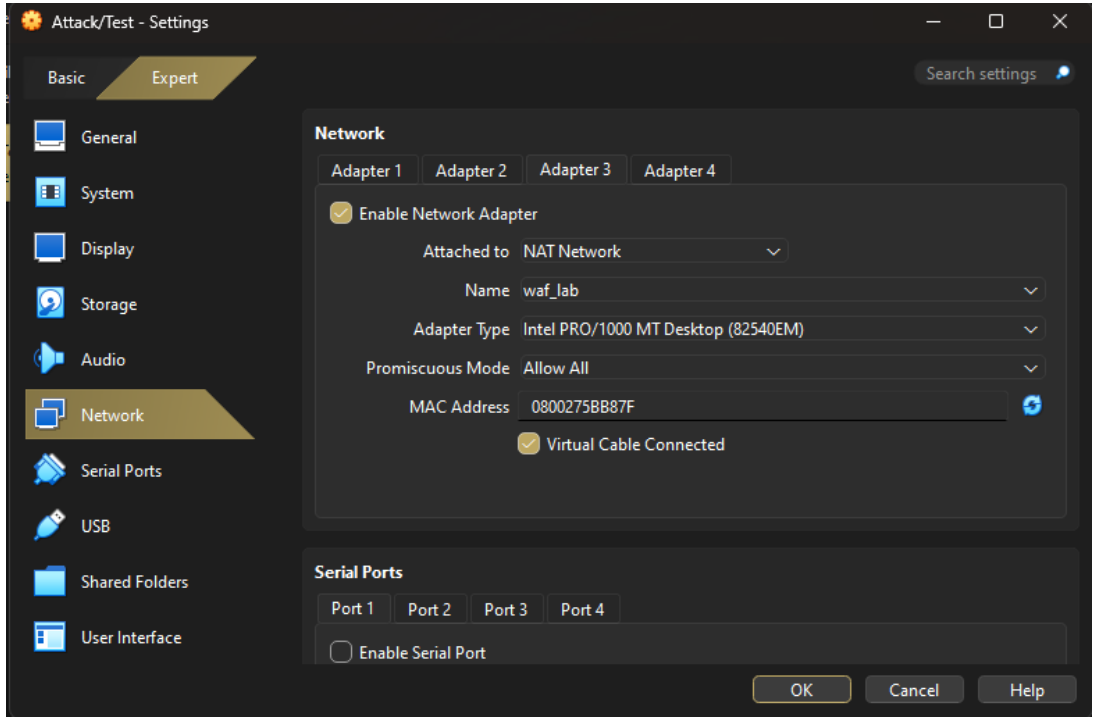
Arhitektura sustava



Mrežna konfiguracija

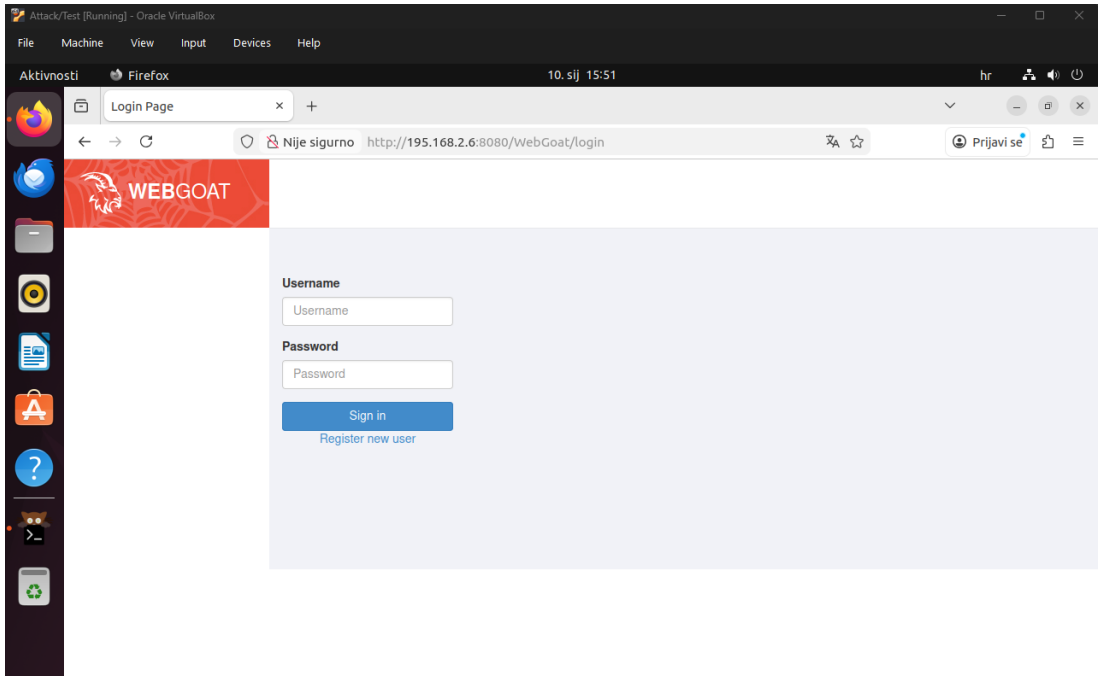
- Nat Network
- Subnet: 195.168.2.0/24
- DHCP omogućen
- Sve VM u istoj mreži





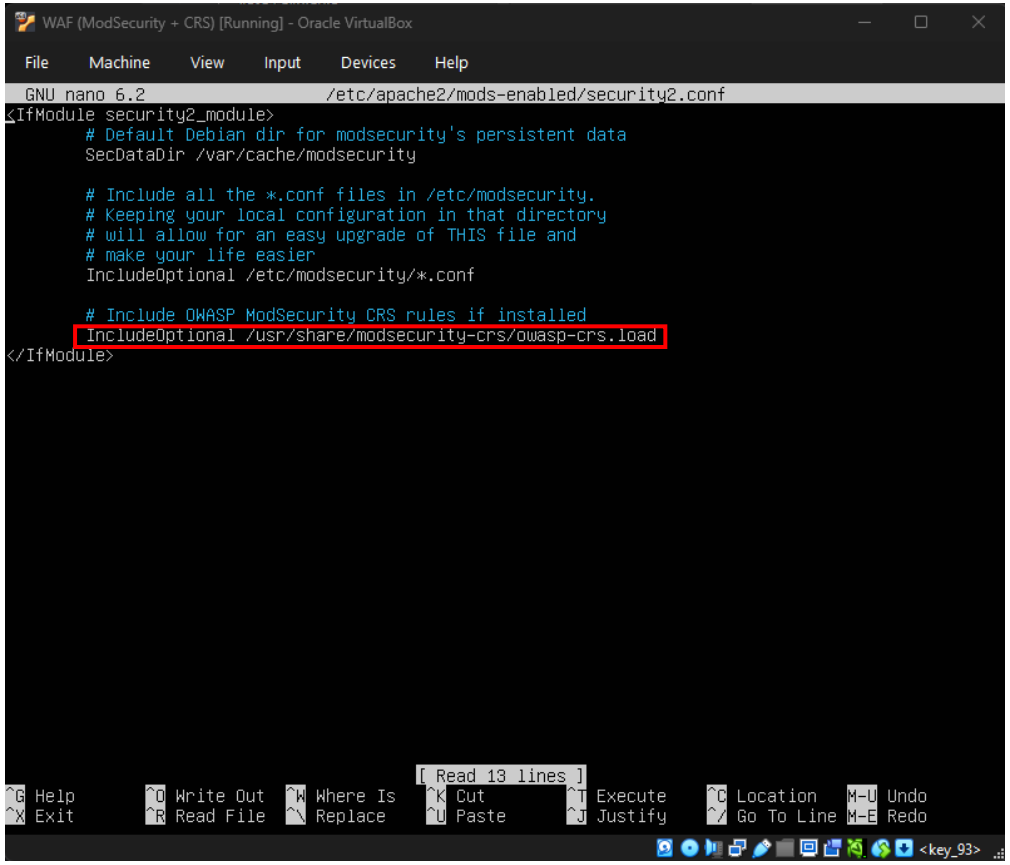
WebGoat aplikacija

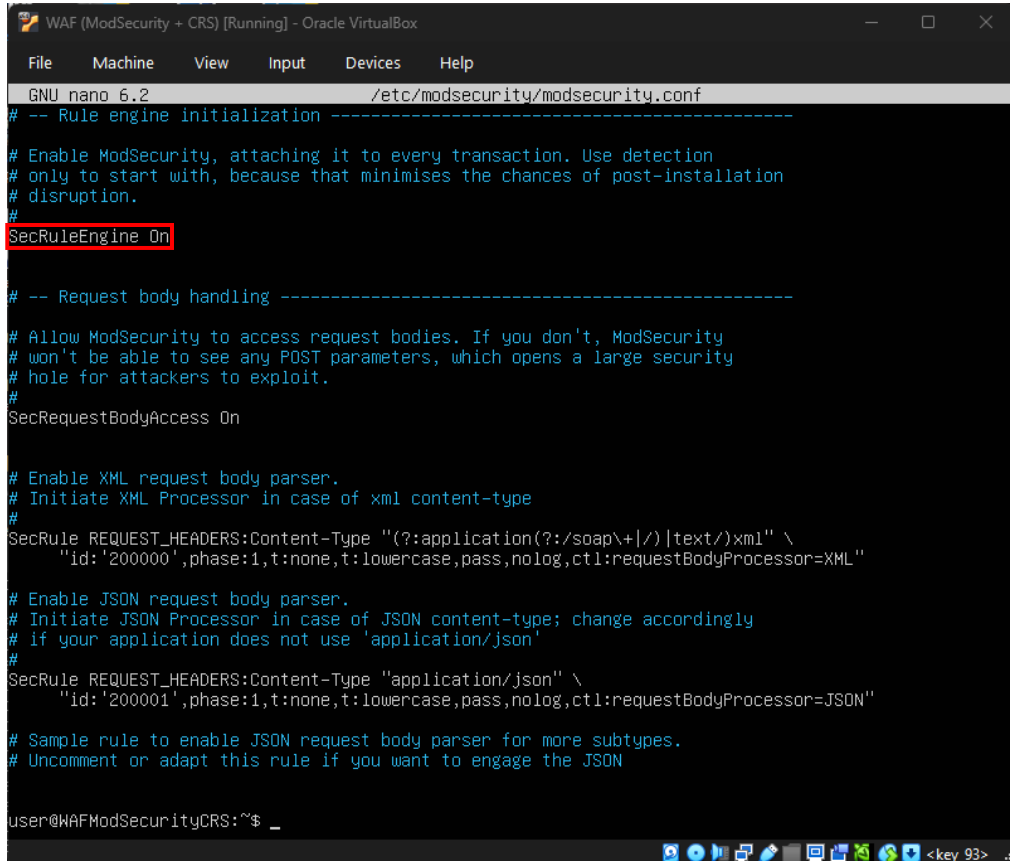
- Testna aplikacija
- Namjerno ranjiva
- Kod za pokretanje: java -jar webgoat-server-8.2.2.jar --server.address=0.0.0.0 --server.port=8080
- Dostupna samo unutar interne mreže

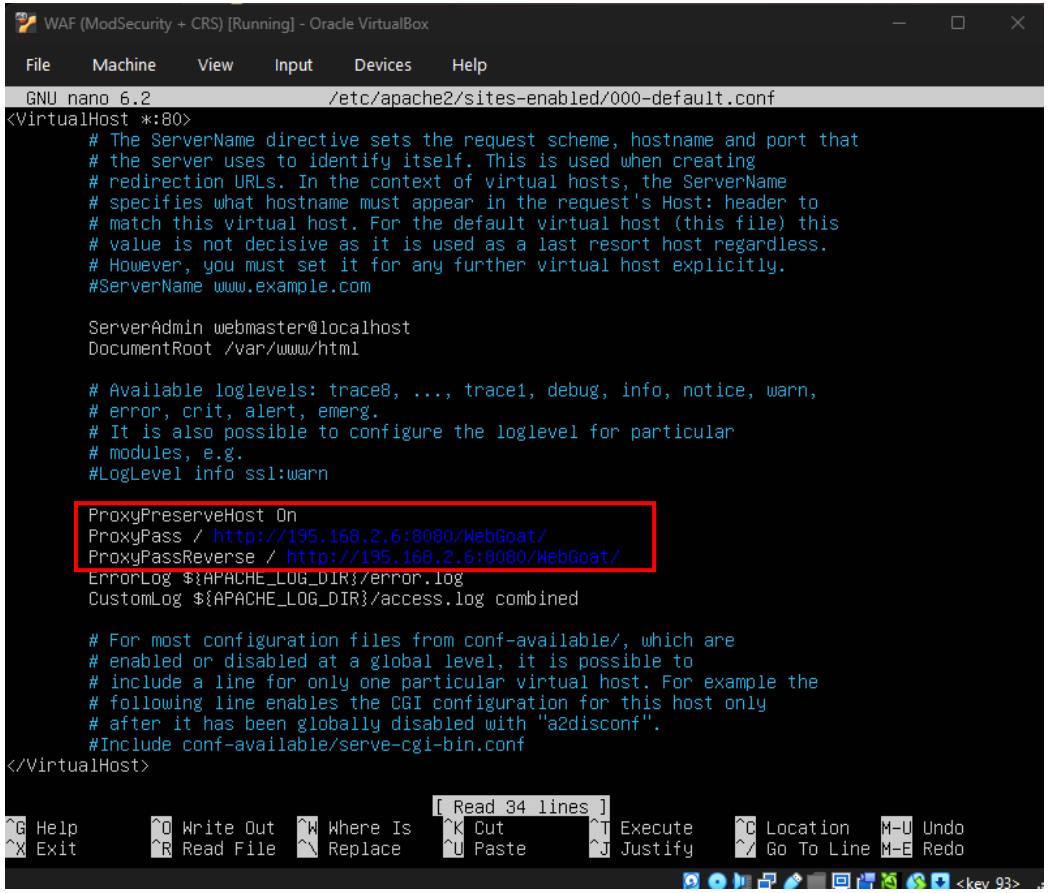


WAF konfiguracija

- Apache webserver - Kod: sudo apt install -y apache2 libapache2-mod-security2 modsecurity-crs
- ModSecurity modul - Kod: sudo cp /etc/modsecurity/modsecurity.conf-recommended /etc/modsecurity/modsecurity.conf
- OWASP Core Rule Set (CRS) -KOD: sudo nano /etc/apache2/mods-enabled/security2.conf





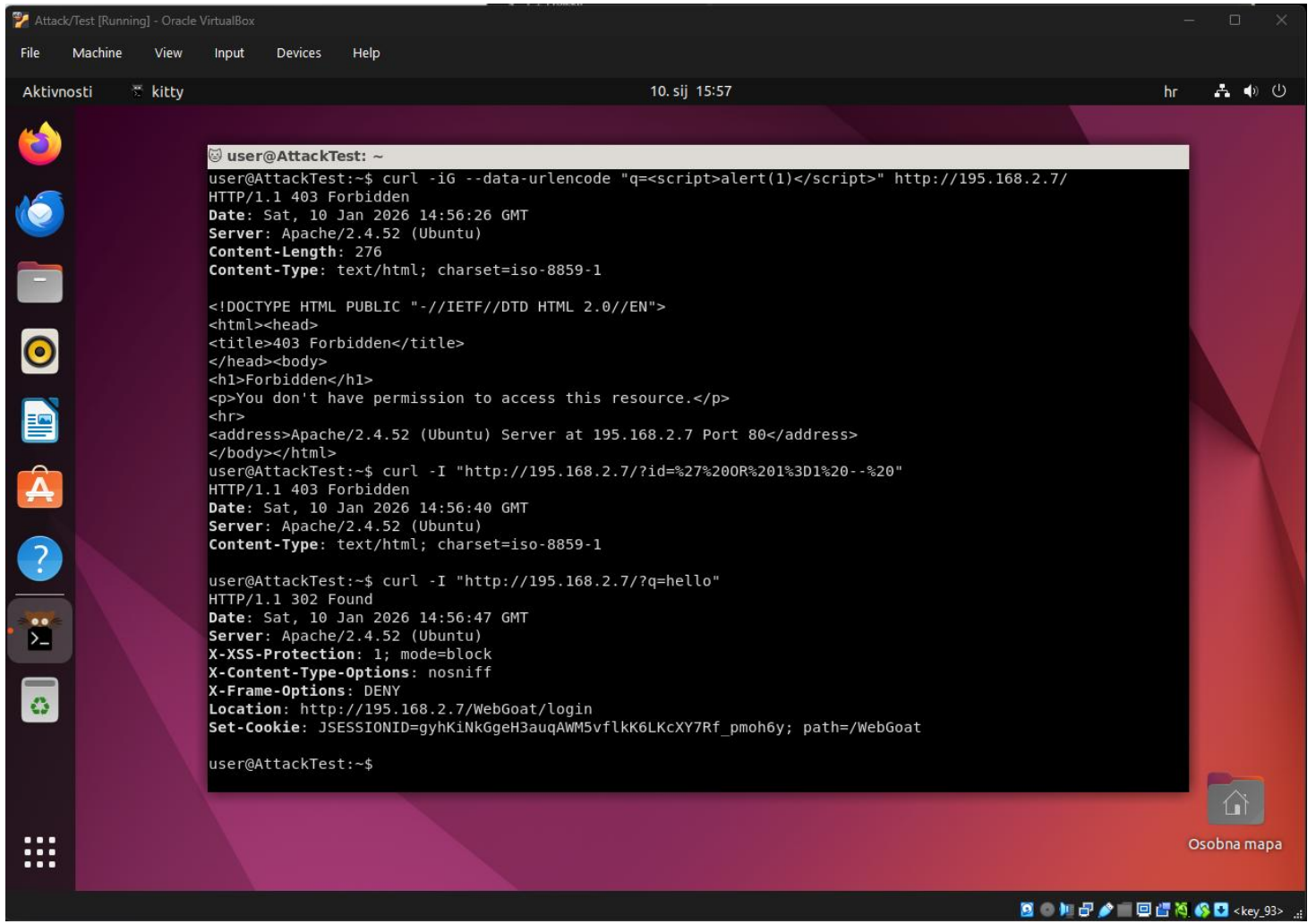


Reverse proxy

- Apache prima sve HTTP zahtjeve
- Prosljeđuje ih WebGoat aplikaciji
- Omogućuje filtriranje prometa
- Kod: sudo nano /etc/apache2/sites-enabled/000-default.conf

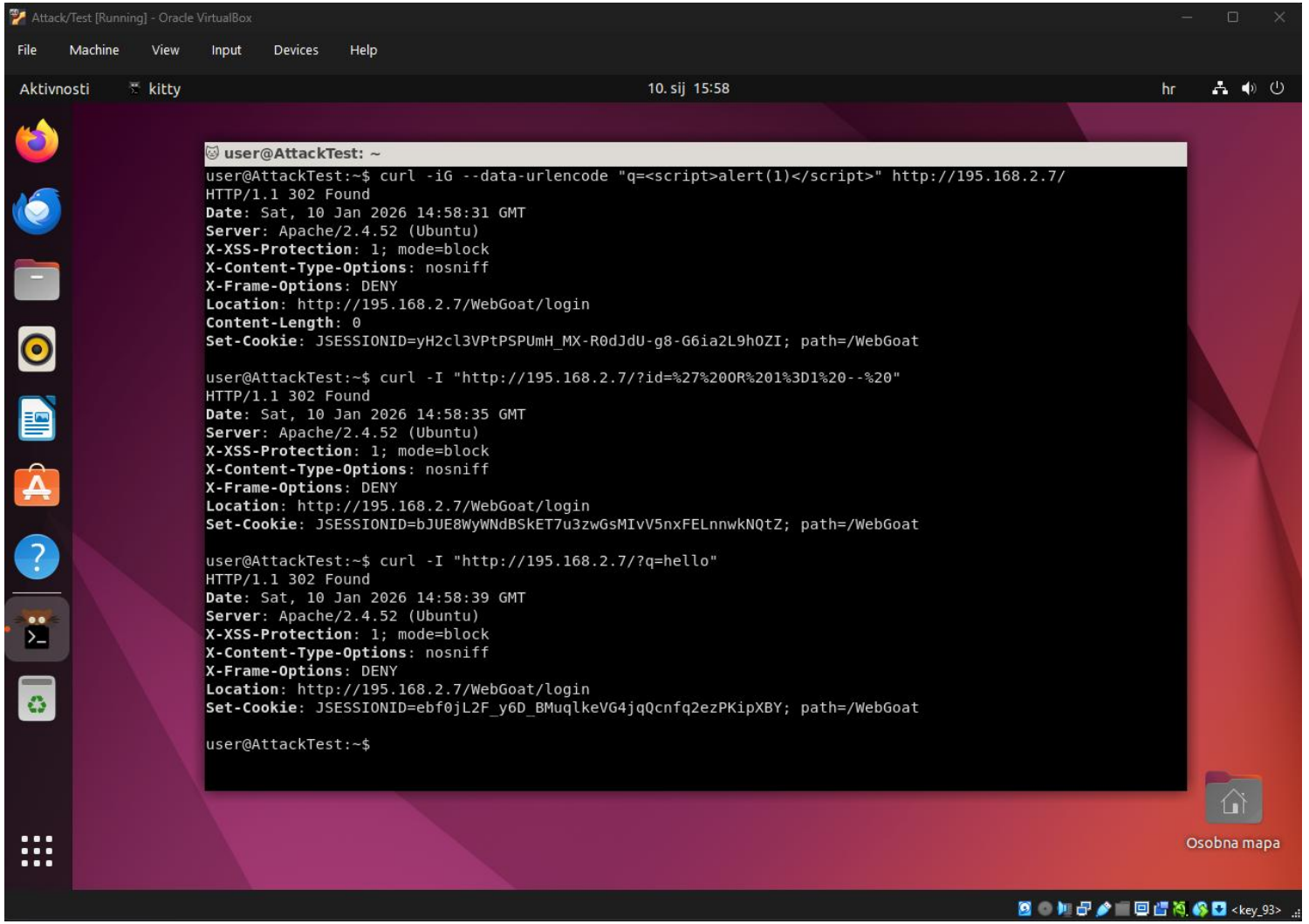
Testiranje

- Sa WAF-om
- SecRuleEngine On
- Legitimni promet dopušten
- Blokira XSS i SQL Injection



Testiranje

- Bez WAF-a
- SecRuleEngine Off
- Prolaze svi zahtjevi
- Aplikacija nije zaštićena



Zaključak

- WAF uspješno detektira i blokira napade
- OWASP CRS pruža osnovnu, ali učinkovitu zaštitu
- Sustav se može dodatno prilagoditi smanjenjem false positive-a

- Usporedba Sa WAF-om i bez WAF-a

Sa WAF-om	Bez WAF-a
XSS i SQL injection blokiran	XSS i SQL injection prolazi
Aktivna zaštita	Nema filtriranja
Zaštićen pristup	Ranjiva aplikacija

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