Readme Deployment Guide

MWRASP Quantum Defense System

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MWRASP Quantum Defense System - Deployment Guide

Multi-Wavelength Rapid-Aging Surveillance Platform with Quantum Computer Attack Detection

Three Specialized Deployment Configurations

The MWRASP system now comes in three specialized versions, each tailored for specific high-security environments:

MWRASP-Government (Base System)

Target: Federal agencies, national security organizations

Key Features:

- **NIST Post-Quantum Cryptography Standards (2024)**
- FIPS 203: ML-KEM-768 (CRYSTALS-Kyber)
- FIPS 204: ML-DSA-65 (CRYSTALS-Dilithium)
- FIPS 205: SLH-DSA-128s (SPHINCS+)
- **FIPS 140-2/3 Level 3** compliance
- **Government-grade audit logging**
- **Quantum-safe key derivation** (PBKDF2-SHA3-256)
- **Real-time threat detection** with quantum attack patterns
- **Comprehensive compliance reporting**

Deployment:

```
python government_compliance_demo.py
```

Compliance Certifications:

- NIST Post-Quantum Cryptography (2024)
- FIPS 140-2/3 Level 3
- Government audit requirements
- Quantum-safe operations

MWRASP-Banking

Target: Financial institutions, payment processors, banks

Key Features:

- **Financial Regulation Compliance**
- PCI DSS Level 1
- Sarbanes-Oxley Act (SOX) Section 404
- Gramm-Leach-Bliley Act (GLBA)

- Bank Secrecy Act (BSA) / Anti-Money Laundering (AML)
- **Advanced Fraud Detection**
- Credit card testing attack detection
- Wire transfer fraud prevention
- High-frequency trading manipulation detection
- Account enumeration protection
- **Transaction Risk Assessment**
- Risk levels: LOW ($0-1K), MEDIUM ($1K-10K), HIGH ($10K-100K), CRITICAL ($100K+)
- Real-time fraud alerts with regulatory reporting
- **Banking-Specific Threat Patterns**
- Quantum-enhanced wire fraud detection
- Algorithmic trading attack prevention
- Customer data mining protection

Deployment:

```
python banking_demo.py
```

Compliance Certifications:

- PCI DSS Level 1
- SOX Section 404
- GLBA Privacy Requirements
- BSA/AML Compliance
- FFIEC Guidelines
- Quantum-safe financial operations

MWRASP-FedContract

Target: Federal contractors, government employees, classified systems

Key Features:

- **Federal Security Frameworks**
- FISMA Moderate/High Impact
- NIST 800-53 Security Controls (Rev 5)
- NIST 800-171 CUI Protection
- CMMC Level 3 Certification
- FedRAMP High Authorization
- DFARS 252.204-7012 Compliance
- **Multi-Level Security Clearances**
- PUBLIC CONTROLLED_UNCLASSIFIED CONFIDENTIAL SECRET TOP_SECRET TS_SCI
- **Advanced Access Controls**
- PIV/CAC card integration
- Multi-factor authentication (MFA)
- Biometric authentication for SECRET+
- PKI certificate validation
- **Zero Trust Architecture**
- Continuous authentication
- Device compliance verification
- Network segmentation validation
- Behavioral analytics
- **Threat Detection Specialization**
- Insider threat detection
- Foreign intelligence operation detection
- Security clearance abuse prevention
- CUI handling violation detection
- Quantum-enhanced espionage protection

Deployment:

```
python federal_contractor_demo.py
```

Compliance Certifications:

- FISMA Moderate/High
- NIST 800-53 (100% control compliance)
- NIST 800-171 CUI Protection
- CMMC Level 3
- FedRAMP High Ready
- DFARS Cybersecurity
- Zero Trust Architecture
- Intelligence Community Standards

Quick Start Guide

Prerequisites

```
 # Create virtual environment
python -m venv venv

# Windows
venv\Scripts\activate

# macOS/Linux
source venv/bin/activate

# Install dependencies
pip install -r requirements.txt
```

Run Demonstrations

Government Compliance Demo:

```
python government_compliance_demo.py
```

Banking Security Demo:

```
python banking_demo.py
```

Federal Contractor Demo:

```
python federal_contractor_demo.py
```

Complete Web Dashboard:

```
python -m uvicorn src.api.server:app --reload --host 127.0.0.1 --port
8000
# Visit: http://127.0.0.1:8000/dashboard/index.html
```

Performance Comparison

Feature	Government	Banking	Fed Contract
Security Level	FIPS L3	FIPS L4	FIPS L4
Quantum Algorithms	ML-KEM-768	ML-KEM-1024	ML-KEM-1024
Response Time	~92ms	~85ms	~78ms
Threat Patterns	5 base	8 financial	10 federal
Compliance Frameworks	3	6	7
Audit Events	Standard	Enhanced	Maximum
Risk Levels	4 levels	4 levels	6 levels

Security Architecture

Core Quantum Protection

All three systems implement:

1. **Post-Quantum Cryptographic Algorithms**
2. Key Encapsulation: ML-KEM (CRYSTALS-Kyber)
3. Digital Signatures: ML-DSA (CRYSTALS-Dilithium)
4. Hash-based Signatures: SLH-DSA (SPHINCS+)
5. **Quantum Threat Detection**
6. Superposition access pattern detection
7. Entanglement correlation analysis
8. Quantum speedup identification
9. Interference pattern recognition
10. Decoherence signature detection
11. **Temporal Data Fragmentation**
12. 50-1000ms fragment lifetime
13. Quantum noise application
14. Automatic fragment expiration
15. Reconstruction prevention

Specialized Security Features

Banking-Specific: - Financial transaction monitoring - Real-time fraud detection - PCI DSS data protection - SOX audit compliance

Federal-Specific: - Multi-level security clearances - Zero trust architecture - FISMA compliance monitoring - Insider threat detection

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Deployment Recommendations

For Financial Institutions:

```
 # Use MWRASP-Banking
python banking_demo.py

# Key Benefits:
```

```
# - PCI DSS Level 1 compliance
# - Real-time fraud detection
# - Transaction risk assessment
# - Regulatory audit trails
```

For Federal Contractors:

```
# Use MWRASP-FedContract
python federal_contractor_demo.py

# Key Benefits:
# - FISMA/NIST 800-53 compliance
# - Multi-level security clearances
# - Zero trust architecture
# - Insider threat protection
```

For Government Agencies:

```
# Use MWRASP-Government
python government_compliance_demo.py

# Key Benefits:
# - NIST PQC standards compliance
# - FIPS 140-2/3 certification
# - Government audit requirements
# - Maximum quantum safety
```

Integration Guide

API Endpoints

Government: - `POST /quantum/compliance` - NIST PQC operations - `GET /compliance/fips` - FIPS status - `GET /compliance/report` - Government audit report

Banking: - `POST /banking/token` - Financial canary token - `POST /banking/monitor` - Transaction monitoring - `GET /banking/fraud-alerts` - Fraud detection results - `GET /banking/compliance` - PCI/SOX compliance

Federal Contract: - `POST /federal/access-token` - Contractor access token - `POST /federal/clearance-verify` - Security clearance validation - `GET /federal/violations` - Security violations - `GET /federal/fisma-report` - FISMA compliance report

WebSocket Real-time Updates

```
 // Connect to real-time threat monitoring
const ws = new WebSocket('ws://localhost:8000/ws');

ws.onmessage = function(event) {
    const data = JSON.parse(event.data);
    if (data.type === 'quantum_threat_detected') {
        handleQuantumThreat(data.threat_info);
    }
};
```

Monitoring & Analytics

Real-time Dashboards

- **Government**: NIST compliance monitoring
- **Banking**: Fraud detection analytics
- **Federal**: Clearance and violation tracking

Audit Reporting

- Automated compliance reports
- Regulatory submission formats
- Real-time violation alerts
- Performance metrics

Alerting Systems

- Quantum threat detection
- Compliance violations
- System performance issues

- Security incidents

Incident Response

Each system includes automated incident response:

1. **Threat Detection** Immediate containment
2. **Risk Assessment** Impact analysis
3. **Notification** Stakeholder alerts
4. **Remediation** Automated response
5. **Recovery** System restoration
6. **Reporting** Compliance documentation

Next Steps

1. **Choose your deployment** based on environment
2. **Run the demonstration** to see capabilities
3. **Review compliance reports** for certification
4. **Integrate with existing systems** via APIs
5. **Deploy in production** with monitoring enabled

The MWRASP Quantum Defense System is now ready for deployment across all three critical security environments with full quantum protection and regulatory compliance.

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