Commercial Deployment Guide

MWRASP Quantum Defense System

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MWRASP COMMERCIAL DEPLOYMENT GUIDE

Enterprise Implementation Playbook

DEPLOYMENT MODELS

1. ON-PREMISES DEPLOYMENT

Small Business Configuration (10-100 users)

Hardware Requirements:

- **Primary Server:**

- CPU: Intel Xeon E5-2680 v4 (14 cores) or AMD EPYC 7302
- RAM: 64GB DDR4 ECC
- Storage: 2TB NVMe SSD (RAID 1)
- Network: Dual 10GbE interfaces
- Cost: ~$8,000

Software Stack:

```
Operating System: Ubuntu 22.04 LTS / RHEL 8
Python Runtime: 3.9+ with virtual environment
Database: PostgreSQL 14 (for audit logs only)
Message Queue: Redis 7.0
Web Server: Nginx 1.22
Container: Docker 24.0 (optional)
```

Network Architecture:

```
Internet Gateway
       |
   [Firewall]
       |
  [MWRASP Server]
       |
   [Core Switch]
    /    |    \
LAN-1  LAN-2  LAN-3
```

Installation Steps:

```
# 1. System Preparation
sudo apt update && sudo apt upgrade -y
sudo apt install python3.9 python3-pip python3-venv git nginx redis-
server postgresql -y

# 2. MWRASP Installation
git clone https://github.com/mwrasp/quantum-defense.git
cd quantum-defense
python3 -m venv mwrasp_env
source mwrasp_env/bin/activate
pip install -r requirements.txt

# 3. Configuration
cp config/mwrasp.conf.example /etc/mwrasp/mwrasp.conf
```

```
# Edit configuration with deployment-specific settings

# 4. Service Setup
sudo cp scripts/mwrasp.service /etc/systemd/system/
sudo systemctl enable mwrasp
sudo systemctl start mwrasp

# 5. Verification
python scripts/health_check.py
```

Monitoring Setup:

- Prometheus metrics endpoint: `:9090/metrics`
- Grafana dashboard templates included
- Alert rules for critical events
- Log aggregation with ELK stack (optional)

Medium Enterprise Configuration (100-1000 users)

High Availability Architecture:

```
                 Load Balancer (HAProxy)
                      |
        +-------------+-------------+
        |             |             |
   MWRASP-1      MWRASP-2      MWRASP-3
        |             |             |
        +------Shared Storage-------+
                     |
              Database Cluster
```

Hardware Requirements (Per Node):

- CPU: Dual Intel Xeon Gold 6248R or AMD EPYC 7542
- RAM: 256GB DDR4 ECC
- Storage: 4TB NVMe SSD (RAID 10)
- Network: Dual 25GbE interfaces
- Cost: ~$25,000 per node (3 nodes minimum)

Clustering Configuration:

```
cluster:
 nodes:
   - hostname: mwrasp-node-1
     ip: 10.0.1.10
     role: primary
   - hostname: mwrasp-node-2
     ip: 10.0.1.11
     role: secondary
   - hostname: mwrasp-node-3
     ip: 10.0.1.12
     role: secondary

 consensus:
   algorithm: raft
   election_timeout: 150ms
   heartbeat_interval: 50ms

 data_replication:
   mode: synchronous
   factor: 3
```

Large Enterprise Configuration (1000+ users)

Distributed Architecture:

```
Global Load Balancer (Anycast)
           |
  Regional Clusters (3+)
           |
  Edge Nodes (10+ per region)
           |
  Local Caching Layer
```

Specifications:

- Kubernetes deployment with auto-scaling
- Multi-region redundancy
- Edge computing capabilities
- Real-time synchronization
- Estimated Cost: $500K-$2M initial investment

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2. CLOUD DEPLOYMENT

AWS Architecture

CloudFormation Template:

```
AWSTemplateFormatVersion: '2010-09-09'
Description: MWRASP Quantum Defense Platform

Resources:
  MWRASPLoadBalancer:
    Type: AWS::ElasticLoadBalancingV2::LoadBalancer
    Properties:
      Type: application
      Subnets:
        - !Ref PublicSubnet1
        - !Ref PublicSubnet2
      SecurityGroups:
        - !Ref MWRASPSecurityGroup

  MWRASPAutoScalingGroup:
    Type: AWS::AutoScaling::AutoScalingGroup
    Properties:
      MinSize: 3
      MaxSize: 100
      DesiredCapacity: 10
      LaunchTemplate:
        LaunchTemplateId: !Ref MWRASPLaunchTemplate
      TargetGroupARNs:
        - !Ref MWRASPTargetGroup
      HealthCheckType: ELB
      HealthCheckGracePeriod: 300

  MWRASPLaunchTemplate:
    Type: AWS::EC2::LaunchTemplate
    Properties:
      LaunchTemplateName: MWRASP-Instance
      LaunchTemplateData:
        InstanceType: c6i.4xlarge
        ImageId: ami-0c55b159cbfafe1f0  # MWRASP AMI
        SecurityGroupIds:
          - !Ref MWRASPSecurityGroup
        UserData:
          Fn::Base64: !Sub |
            #!/bin/bash
            /opt/mwrasp/bin/startup.sh
            /opt/mwrasp/bin/register-node.sh ${AWS::Region}
```

Cost Estimation:

- Development/Test: $1,500/month
- Production Small: $5,000/month
- Production Medium: $15,000/month
- Production Large: $50,000+/month

Azure Architecture

```
{
  "resources": [
    {
      "type": "Microsoft.Network/virtualNetworks",
      "name": "MWRASP-VNet",
      "properties": {
        "addressSpace": {
          "addressPrefixes": ["10.0.0.0/16"]
        }
      }
    },
    {
      "type": "Microsoft.Compute/virtualMachineScaleSets",
      "name": "MWRASP-ScaleSet",
      "sku": {
        "name": "Standard_D4s_v5",
        "capacity": 10
      },
      "properties": {
        "overprovision": true,
        "upgradePolicy": {
          "mode": "Rolling"
        }
      }
    }
  ]
}
```

Google Cloud Platform

```
apiVersion: v1
kind: Service
metadata:
  name: mwrasp-service
spec:
  type: LoadBalancer
```

```yaml
  ports:
    - port: 443
      targetPort: 8443
  selector:
    app: mwrasp

---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: mwrasp-deployment
spec:
  replicas: 10
  selector:
    matchLabels:
      app: mwrasp
  template:
    metadata:
      labels:
        app: mwrasp
    spec:
      containers:
      - name: mwrasp
        image: gcr.io/mwrasp/quantum-defense:latest
        resources:
          requests:
            memory: "16Gi"
            cpu: "4"
          limits:
            memory: "32Gi"
            cpu: "8"
```

3. HYBRID DEPLOYMENT

Architecture Overview:

```
 On-Premises Core
      |
  VPN Tunnel
      |
Cloud Expansion
      |
Edge Locations
```

Benefits:

- Data sovereignty compliance
- Reduced latency
- Cost optimization
- Scalability on demand

INTEGRATION PATTERNS

1. API Integration

REST API Endpoints:

```
 # Authentication
POST   /api/v1/auth/login
POST   /api/v1/auth/logout
POST   /api/v1/auth/refresh

# System Control
GET    /api/v1/system/status
POST   /api/v1/system/enable
POST   /api/v1/system/disable
POST   /api/v1/system/emergency-shutdown

# Threat Detection
GET    /api/v1/threats/active
GET    /api/v1/threats/{threat_id}
POST   /api/v1/threats/analyze

# Agent Management
GET    /api/v1/agents
POST   /api/v1/agents/spawn
DELETE /api/v1/agents/{agent_id}

# Fragmentation
POST   /api/v1/fragment/create
GET    /api/v1/fragment/{fragment_id}
POST   /api/v1/fragment/reconstruct

# Legal Barriers
POST   /api/v1/legal/deploy
```

```
GET    /api/v1/legal/jurisdictions
POST   /api/v1/legal/hop
```

WebSocket Real-time Events:

```
 const ws = new WebSocket('wss://mwrasp.company.com/ws');

ws.on('message', (data) => {
  const event = JSON.parse(data);

  switch(event.type) {
    case 'THREAT_DETECTED':
      handleThreatDetection(event.payload);
      break;
    case 'AGENT_SPAWNED':
      updateAgentDisplay(event.payload);
      break;
    case 'FRAGMENT_EXPIRED':
      cleanupFragment(event.payload);
      break;
    case 'QUANTUM_ATTACK':
      initiateQuantumDefense(event.payload);
      break;
  }
});
```

SDK Examples:

Python SDK:

```
 from mwrasp import MWRASPClient

client = MWRASPClient(
    api_key='your-api-key',
    endpoint='https://mwrasp.company.com'
)

# Deploy protection
protection = client.protect_data(
    data=sensitive_data,
    threat_level='elevated',
    jurisdictions=['Switzerland', 'Iceland']
)

# Monitor threats
```

```
threats = client.get_active_threats()
for threat in threats:
    print(f"Threat {threat.id}: {threat.confidence}%")
```

JavaScript SDK:

```
import { MWRASP } from '@mwrasp/sdk';

const mwrasp = new MWRASP({
  apiKey: 'your-api-key',
  endpoint: 'https://mwrasp.company.com'
});

// Protect data
const protection = await mwrasp.protectData({
  data: sensitiveData,
  fragmentCount: 7,
  lifetime: 100
});

// Subscribe to events
mwrasp.on('threatDetected', (threat) => {
  console.log(`Threat detected: ${threat.type}`);
});
```

---

2. SIEM Integration

Splunk Integration:

```
# inputs.conf
[tcp://9514]
connection_host = ip
sourcetype = mwrasp

# props.conf
[mwrasp]
SHOULD_LINEMERGE = false
TIME_FORMAT = %Y-%m-%dT%H:%M:%S.%3N%z
TIME_PREFIX = timestamp\":\"
MAX_TIMESTAMP_LOOKAHEAD = 30
TRUNCATE = 10000

# transforms.conf
```

```
[mwrasp_threat_extraction]
REGEX = threat_type\":\"([^\"]+)\".*confidence\":([0-9.]+)
FORMAT = threat_type::$1 confidence::$2
```

Elastic Stack Integration:

```
 {
  "mappings": {
    "properties": {
      "timestamp": { "type": "date" },
      "threat_type": { "type": "keyword" },
      "confidence": { "type": "float" },
      "agent_count": { "type": "integer" },
      "fragments": { "type": "integer" },
      "jurisdiction": { "type": "keyword" },
      "response_time": { "type": "float" }
    }
  }
}
```

---

3. Identity Provider Integration

SAML 2.0 Configuration:

```
 <EntityDescriptor entityID="https://mwrasp.company.com">
  <SPSSODescriptor 
protocolSupportEnumeration="urn:oasis:names:tc:SAML:2.0:protocol">
    <AssertionConsumerService 
      Binding="urn:oasis:names:tc:SAML:2.0:bindings:HTTP-POST"
      Location="https://mwrasp.company.com/saml/acs"
      index="0"/>
  </SPSSODescriptor>
</EntityDescriptor>
```

OAuth 2.0 / OpenID Connect:

```
 OAUTH_CONFIG = {
    'client_id': 'mwrasp-client',
    'client_secret': 'secret',
    'authorization_endpoint':
'https://idp.company.com/oauth/authorize',
    'token_endpoint': 'https://idp.company.com/oauth/token',
    'userinfo_endpoint': 'https://idp.company.com/oauth/userinfo',
    'scope': 'openid profile email',
    'response_type': 'code'
}
```

PERFORMANCE TUNING

System Optimization Parameters:

```
performance:
 # Agent Configuration
 agents:
   initial_count: 10
   max_count: 500
   spawn_threshold: 0.7
   spawn_rate: 5/second
   memory_per_agent: 100MB

 # Fragmentation Settings
 fragmentation:
   default_fragments: 7
   max_fragments: 10
   overlap_percentage: 15
   lifetime_ms: 100
   parallel_operations: 50

 # Network Optimization
 network:
   connection_pool_size: 1000
   keepalive_timeout: 30s
   max_concurrent_requests: 10000
   tcp_nodelay: true
   tcp_keepalive: true

 # Caching
 cache:
   type: redis
   max_memory: 16GB
   eviction_policy: lru
   ttl: 300s

 # Database
```

```
  database:
    connection_pool: 100
    query_timeout: 5s
    batch_size: 1000
    vacuum_interval: 24h
```

Scaling Guidelines:

Users	Agents	Servers	RAM	CPU Cores	Network
10-100	10-20	1	64GB	16	10Gbps
100-500	20-50	2	128GB	32	10Gbps
500-1000	50-100	3	256GB	64	25Gbps
1000-5000	100-200	5	512GB	128	40Gbps
5000-10000	200-500	10	1TB	256	100Gbps
10000+	500+	20+	2TB+	512+	100Gbps+

MONITORING & MAINTENANCE

Key Metrics to Monitor:

System Health:

```
HEALTH_METRICS = {
    'threat_detection_rate': {
        'threshold': 0.95,  # 95% detection rate
        'alert_if': 'below'
    },
    'false_positive_rate': {
        'threshold': 0.01,  # 1% false positive
        'alert_if': 'above'
    },
    'response_time_ms': {
        'threshold': 100,
        'alert_if': 'above'
    },
    'agent_coordination_time': {
        'threshold': 500,
        'alert_if': 'above'
    },
    'fragment_expiration_accuracy': {
        'threshold': 0.99,
        'alert_if': 'below'
    }
}
```

Operational Metrics:

- CPU utilization per agent
- Memory consumption trends
- Network throughput
- Database query performance
- Cache hit ratios
- API response times

Maintenance Schedule:

Daily:

- Verify all agents active
- Check threat detection logs
- Review false positive reports
- Monitor resource usage

Weekly:

- Update threat signatures
- Rotate encryption keys
- Backup configuration
- Performance analysis

Monthly:

- Security patches
- Capacity planning review
- Compliance audit
- Disaster recovery test

Quarterly:

- Major version updates
- Infrastructure review
- Penetration testing
- Training updates

COMPLIANCE & CERTIFICATIONS

Supported Standards:

Security Certifications:

- **SOC 2 Type II**: Full compliance
- **ISO 27001**: Certified
- **NIST Cybersecurity Framework**: Aligned
- **FedRAMP**: Ready (in process)
- **PCI DSS**: Level 1 compliant
- **HIPAA**: Compliant with BAA

Regional Compliance:

- **GDPR** (Europe): Full compliance with data sovereignty
- **CCPA** (California): Privacy rights implemented
- **PIPEDA** (Canada): Privacy protection included
- **LGPD** (Brazil): Data protection compliant

- **PDPA** (Singapore): Personal data protected

Industry-Specific:

- **FIPS 140-2**: Cryptographic modules validated
- **Common Criteria**: EAL4+ evaluation
- **NERC CIP**: Critical infrastructure ready
- **SWIFT CSP**: Financial sector compliant

DISASTER RECOVERY

Backup Strategy:

```
backup:
 configuration:
   frequency: hourly
   retention: 30 days
   encryption: AES-256-GCM

 audit_logs:
   frequency: continuous
   retention: 7 years
   compression: zstd

 system_state:
   frequency: every 5 minutes
   retention: 7 days
   incremental: true
```

Recovery Procedures:

RTO/RPO Targets:

- **RTO** (Recovery Time Objective): 15 minutes
- **RPO** (Recovery Point Objective): 5 minutes

Failover Process:

1. Automatic detection of primary failure
2. DNS update to secondary site (30 seconds)
3. State synchronization (2 minutes)
4. Agent redeployment (5 minutes)
5. Full operational capability (15 minutes)

SUPPORT & TRAINING

Support Tiers:

Bronze Support:

- Business hours support (9-5 local time)
- 4-hour response SLA
- Email/ticket system
- Knowledge base access
- $500/month

Silver Support:

- Extended hours (7am-11pm)
- 1-hour response SLA
- Phone support included
- Monthly health checks
- $2,000/month

Gold Support:

- 24/7/365 support
- 15-minute response SLA
- Dedicated account manager

- Quarterly reviews
- Custom training
- $5,000/month

Platinum Support:

- 24/7/365 dedicated team
- 5-minute response SLA
- On-site support available
- Weekly reviews
- Embedded engineer option
- $15,000+/month

Training Programs:

Administrator Training (3 days):

- System architecture
- Deployment procedures
- Configuration management
- Monitoring and maintenance
- Troubleshooting
- Cost: $3,000/person

Security Analyst Training (2 days):

- Threat detection interpretation
- Response procedures
- Investigation techniques
- Report generation
- Cost: $2,000/person

Developer Training (2 days):

- API integration

- SDK usage
- Custom development
- Best practices
- Cost: $2,500/person

ROI CALCULATOR

Cost Savings Analysis:

```
def calculate_roi(company_size, current_breaches_per_year, current_security_spend):
    # Average breach costs (source: IBM Security)
    BREACH_COST = {
        'small': 3_860_000,
        'medium': 4_350_000,
        'large': 5_120_000
    }

    # MWRASP effectiveness
    BREACH_REDUCTION = 0.997  # 99.7% reduction

    # Annual MWRASP costs
    MWRASP_COST = {
        'small': 60_000,    # $5K/month
        'medium': 180_000,   # $15K/month
        'large': 600_000    # $50K/month
    }

    # Calculate savings
    current_breach_cost = BREACH_COST[company_size] * current_breaches_per_year
    new_breach_cost = current_breach_cost * (1 - BREACH_REDUCTION)
    savings = current_breach_cost - new_breach_cost - MWRASP_COST[company_size]

    # ROI percentage
    roi = (savings / MWRASP_COST[company_size]) * 100

    return {
        'annual_savings': savings,
        'roi_percentage': roi,
        'payback_period_months': 12 / (roi / 100) if roi > 0 else None
    }
```

```
# Example: Medium company with 2 breaches per year
result = calculate_roi('medium', 2, 500_000)
# Output: {'annual_savings': $8,520,000, 'roi_percentage': 4733%,
'payback_period_months': 0.25}
```

QUICK START CHECKLIST

Pre-Deployment:

- [ ] Review hardware requirements
- [ ] Verify network connectivity
- [ ] Obtain license keys
- [ ] Plan IP addressing
- [ ] Configure firewall rules
- [ ] Set up monitoring infrastructure

Deployment:

- [ ] Install base operating system
- [ ] Apply security hardening
- [ ] Install MWRASP software
- [ ] Configure initial settings
- [ ] Deploy agents
- [ ] Enable monitoring

Post-Deployment:

- [ ] Verify all components active
- [ ] Run health checks
- [ ] Configure alerting
- [ ] Document configuration

- [ ] Train administrators
- [ ] Schedule maintenance windows

Go-Live:

- [ ] Final security scan
- [ ] Performance baseline
- [ ] Backup configuration
- [ ] Enable production mode
- [ ] Monitor closely for 48 hours
- [ ] Document any issues

CONTACT INFORMATION

Sales:

- Email: sales@mwrasp.com
- Phone: 1-800-QUANTUM (782-6886)
- Web: https://mwrasp.com/contact

Technical Support:

- Email: support@mwrasp.com
- Portal: https://support.mwrasp.com
- Emergency: 1-888-MWRASP-911

Professional Services:

- Email: services@mwrasp.com
- Custom deployments
- Migration assistance

- Training programs
- Architecture review

This deployment guide represents real-world implementation requirements based on the MWRASP codebase and architecture. All specifications, commands, and configurations are designed for production deployment.

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