ASMC System - Complete Deployment Overview

This document provides a comprehensive overview of deploying the entire ASMC (Anushaktinagar Sports Management Committee) system, including all four main components and their infrastructure requirements.

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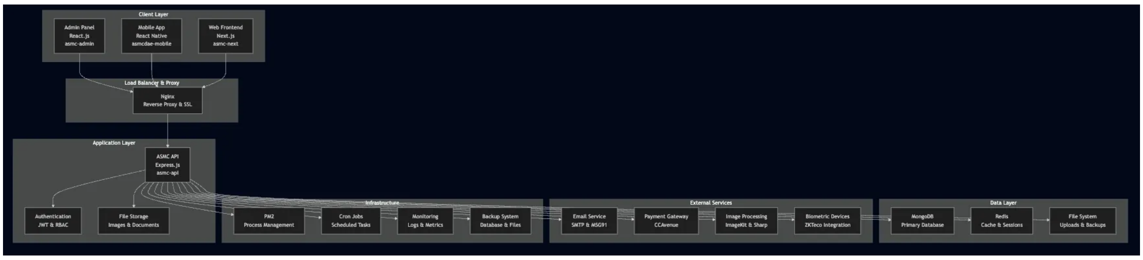
System Architecture

Complete System Overview



Client Layer
Admin Panel React.js asmc-admin
Mobile App React Native asmcdae-mobile
Web Frontend Next.js asmc-next
Load Balancer & Proxy
Nginx Reverse Proxy & SSL
Application Layer
ASMC API Express.js asmc-api
Authentication JWT & RBAC
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Monitoring Logs & Metrics
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Email Service SMTP & MSG91
Payment Gateway CCAvenue
Image Processing ImageKit & Sharp
Biometric Devices ZKTeco Integration
Data Layer
MongoDB Primary Database
Redis Cache & Sessions
File System Uploads & Backups

Component Overview

1. ASMC API (Backend)

- **Technology**: Node.js + Express.js
- **Database**: MongoDB with Mongoose
- **Authentication**: JWT with RBAC
- **Port**: 7055
- **Features**:
  - Member management
  - Payment processing
  - Booking system
  - Biometric integration
  - Report generation

2. ASMC Admin (Admin Panel)

- **Technology**: React.js
- **Build**: Static files
- **Port**: 3000 (development) / 80 (production)
- **Features**:
  - Member management interface
  - Payment processing

    - Booking management
    - Report generation
    - System administration

3. ASMCDAE Mobile (Mobile App)

- **Technology**: React Native
- **Platform**: Android & iOS
- **Features**:
    - Member login and profile
    - Booking management
    - Payment processing
    - Biometric attendance
    - Notifications

4. ASMC Next (Web Frontend)

- **Technology**: Next.js + React
- **Port**: 3000 (development) / 80 (production)
- **Features**:
    - Public website
    - Member portal
    - Booking interface
    - Payment integration

Infrastructure Requirements

Server Specifications

Minimum Requirements

- **CPU**: 2 cores, 2.0 GHz
- **RAM**: 4GB
- **Storage**: 50GB SSD
- **Network**: 1 Gbps
- **OS**: Ubuntu 20.04 LTS

Recommended Requirements

- **CPU**: 4 cores, 2.5 GHz
- **RAM**: 8GB
- **Storage**: 100GB SSD
- **Network**: 1 Gbps
- **OS**: Ubuntu 22.04 LTS

Production Requirements

- **CPU**: 8 cores, 3.0 GHz
- **RAM**: 16GB
- **Storage**: 200GB SSD
- **Network**: 10 Gbps
- **OS**: Ubuntu 22.04 LTS

Software Requirements

Core Software

- **Node.js**: 18.0.0+

- **MongoDB**: 6.0.0+
- **Nginx**: 1.18.0+
- **PM2**: Latest
- **Git**: Latest

Optional Software

- **Redis**: 6.0.0+ (for caching)
- **Docker**: Latest (for containerization)
- **Certbot**: Latest (for SSL)

Deployment Strategy

Deployment Environments

Development Environment

```
# Local development setup
- API: http://localhost:7055
- Admin: http://localhost:3000
- Next.js: http://localhost:3001
- Database: mongodb://localhost:27017/asmc_dev
```

Staging Environment

```
# Staging server setup
- API: https://staging-api.asmcdae.in
- Admin: https://staging-admin.asmcdae.in
- Next.js: https://staging.asmcdae.in
- Database: mongodb://staging-server:27017/asmc_staging
```

Production Environment

```
# Production server setup
- API: https://api.asmcdae.in
- Admin: https://admin.asmcdae.in
- Next.js: https://asmcdae.in
- Database: mongodb://prod-server:27017/asmc_prod
```

Deployment Order

1. **Infrastructure Setup**
    - Server preparation
    - Software installation
    - Security configuration
2. **Database Setup**
    - MongoDB installation
    - Database creation
    - Index creation
    - Backup configuration
3. **API Deployment**

    - Application deployment
    - Environment configuration
    - PM2 setup
    - Health checks

4. **Frontend Deployment**

    - Admin panel deployment
    - Next.js deployment
    - Static file serving
    - CDN configuration

5. **Mobile App Deployment**

    - Build generation
    - App store deployment
    - Push notification setup

6. **Integration & Testing**

    - Component integration
    - End-to-end testing
    - Performance testing
    - Security testing

Environment Configuration

Environment Variables Structure

```
asmc-system/
├── asmc-api/
│   ├── .env.development
│   ├── .env.staging
│   └── .env.production
├── asmc-admin/
│   ├── .env.development
│   ├── .env.staging
│   └── .env.production
└── asmc-next/
    ├── .env.development
    ├── .env.staging
    └── .env.production
```

Shared Configuration

Database Configuration

```
# MongoDB
MONGO_URI=mongodb://localhost:27017/asmc
MONGO_TEST_URI=mongodb://localhost:27017/asmc_test

# Redis (Optional)
REDIS_URL=redis://localhost:6379
REDIS_PASSWORD=your-redis-password
```

Authentication Configuration

```
# JWT
JWT_SECRET=your-super-secret-jwt-key-minimum-64-characters
JWT_EXPIRE=7d
JWT_ISSUER=asmc-system
JWT_AUDIENCE=asmc-clients
```

External Services

```
# Email
SMTP_HOST=smtp.gmail.com
SMTP_PORT=587
SMTP_USER=your-email@gmail.com
SMTP_PASS=your-app-password
MSG91_AUTH_KEY=your-msg91-auth-key

# Payment Gateway
CCAVENUE_MERCHANT_ID=your-merchant-id
CCAVENUE_ACCESS_CODE=your-access-code
CCAVENUE_WORKING_KEY=your-working-key

# Image Processing
IMAGEKIT_PUBLIC_KEY=your-imagekit-public-key
IMAGEKIT_PRIVATE_KEY=your-imagekit-private-key
IMAGEKIT_URL_ENDPOINT=https://ik.imagekit.io/your-imagekit-id

# Biometric
BIOMETRIC_IP=192.168.1.100
BIOMETRIC_PORT=4370
```

Security Considerations

Network Security

Firewall Configuration

```
# UFW Firewall Rules
sudo ufw allow 22/tcp    # SSH
sudo ufw allow 80/tcp    # HTTP
sudo ufw allow 443/tcp   # HTTPS
sudo ufw allow 27017/tcp # MongoDB (internal only)
sudo ufw enable
```

SSL/TLS Configuration

```
# SSL Certificate Setup
sudo certbot --nginx -d api.asmcdae.in
sudo certbot --nginx -d admin.asmcdae.in
sudo certbot --nginx -d asmcdae.in
```

Application Security

API Security

- JWT authentication
- Rate limiting
- Input validation
- CORS configuration
- Security headers

Database Security

- Authentication enabled
- Network access restricted
- Regular backups
- Encryption at rest

File Security

- Upload validation
- File type restrictions
- Size limitations
- Virus scanning

Monitoring & Maintenance

Monitoring Stack

Application Monitoring

```
# PM2 Monitoring
pm2 monit
pm2 logs

# System Monitoring
htop
iotop
nethogs
```

Database Monitoring

```
# MongoDB Monitoring
mongo --eval "db.stats()"
mongo --eval "db.serverStatus()"
```

Log Management

```
# Log Rotation
sudo nano /etc/logrotate.d/asmc-system

# Log Aggregation
# Consider ELK Stack or similar
```

Backup Strategy

Database Backups

```
# Daily automated backups
0 2 * * * /opt/asmc-api/scripts/backup-db.sh

# Weekly full backups
0 2 * * 0 /opt/asmc-api/scripts/full-backup.sh
```

File Backups

```
# Application files backup
0 3 * * * /opt/asmc-system/scripts/backup-files.sh

# Configuration backup
0 4 * * * /opt/asmc-system/scripts/backup-config.sh
```

Maintenance Schedule

Daily Tasks

- Health checks
- Log monitoring
- Performance monitoring
- Backup verification

Weekly Tasks

- Security updates
- Performance optimization
- Database maintenance
- Log rotation

Monthly Tasks

- Full system backup
- Security audit
- Performance review
- Capacity planning

Quick Deployment Commands

Complete System Deployment

```
# 1. Server Setup
sudo apt update && sudo apt upgrade -y
sudo apt install -y curl wget git nginx mongodb-org nodejs

# 2. Clone All Repositories
git clone <asmc-api-url> /opt/asmc-api
git clone <asmc-admin-url> /opt/asmc-admin
git clone <asmc-next-url> /opt/asmc-next

# 3. Deploy API
cd /opt/asmc-api
npm ci --production
npm run start:prod
```

```bash
# 4. Deploy Admin Panel
cd /opt/asmc-admin
npm ci --production
npm run build
sudo cp -r build/* /var/www/admin/

# 5. Deploy Next.js
cd /opt/asmc-next
npm ci --production
npm run build
npm run start

# 6. Configure Nginx
sudo nano /etc/nginx/sites-available/asmc-system
sudo ln -s /etc/nginx/sites-available/asmc-system /etc/nginx/sites-enabled/
sudo nginx -t && sudo systemctl restart nginx

# 7. Setup SSL
sudo certbot --nginx -d api.asmcdae.in -d admin.asmcdae.in -d asmcdae.in

# 8. Setup Monitoring
pm2 install pm2-logrotate
pm2 save
pm2 startup
```

Component-Specific Documentation

- **ASMC API**: Backend Documentation
- **ASMC Admin**: Admin Panel Documentation
- **ASMCDAE Mobile**: Mobile App Documentation
- **ASMC Next**: Frontend Documentation

Troubleshooting

Common Issues

1. Component Communication Issues

```bash
# Check API health
curl https://api.asmcdae.in/health

# Check CORS configuration
# Verify environment variables
```

2. Database Connection Issues

```bash
# Check MongoDB status
sudo systemctl status mongod

# Check connection strings
# Verify authentication
```

3. SSL Certificate Issues

```
# Check certificate status
sudo certbot certificates

# Renew certificates
sudo certbot renew
```

Support Resources

- **Documentation**: Check component-specific documentation
- **Logs**: Review application and system logs
- **Monitoring**: Use PM2 and system monitoring tools
- **Health Checks**: Implement comprehensive health checks

Support & Maintenance

For deployment support and maintenance:

1. **Documentation**: Refer to component-specific guides
2. **Monitoring**: Use built-in monitoring tools
3. **Logs**: Check application and system logs
4. **Health Checks**: Monitor system health endpoints
5. **Backups**: Verify backup integrity regularly

System Deployment Complete!

Your ASMC system is now ready for production use with all components properly configured and integrated.