# Kea DHCP Manager

A modern, minimalist, and user-friendly web application for managing a Kea DHCP server on Debian-based systems. Built with Ruby and Sinatra, featuring a responsive dashboard-style interface for administrators.

## Features

### Core Functionality

* **Subnet Management**: Add and delete DHCP subnets with validation
* **IP Reservations**: Reserve specific IP addresses using MySQL database backend
* **Server Monitoring**: Real-time Kea server status and active lease monitoring
* **Configuration Management**: Validate, backup, and reload Kea configurations
* **Activity Logging**: Comprehensive logging of all DHCP management actions

### User Interface

* **Responsive Design**: Modern, minimalist interface that works on all devices
* **Dashboard**: Overview of server status, active leases, and system health
* **Real-time Updates**: Auto-refreshing status indicators and lease information
* **Intuitive Forms**: User-friendly forms with validation and helpful feedback

### Security & Reliability

* **Authentication**: Secure login system with session management
* **Input Validation**: Comprehensive validation for IP addresses, MAC addresses, and network configurations
* **Configuration Backup**: Automatic backup system with restore capabilities
* **Error Handling**: Robust error handling with detailed logging

## Requirements

### System Requirements

* **Operating System**: Debian-based Linux distribution (Ubuntu, Debian)
* **Ruby**: Version 3.0 or higher
* **MySQL**: Version 8.0 or higher
* **Kea DHCP**: Version 2.0 or higher

### Dependencies

* Sinatra web framework
* MySQL2 database connector
* Sequel ORM
* Bootstrap 5 (included via CDN)

## Installation

### 1. Install System Dependencies

# Update package list  
sudo apt update  
  
# Install Ruby and development tools  
sudo apt install ruby ruby-dev build-essential  
  
# Install MySQL server  
sudo apt install mysql-server  
  
# Install Kea DHCP server  
sudo apt install kea-dhcp4-server kea-ctrl-agent  
  
# Install Bundler gem  
sudo gem install bundler

### 2. Download and Setup Application

# Clone or download the application  
cd /opt  
sudo git clone <repository-url> kea-dhcp-manager  
cd kea-dhcp-manager  
  
# Install Ruby dependencies  
sudo bundle install  
  
# Setup directories  
rake install

### 3. Configure MySQL Database

# Secure MySQL installation  
sudo mysql\_secure\_installation  
  
# Setup database  
rake setup\_db

### 4. Configure Environment

# Copy environment configuration  
cp .env.example .env  
  
# Edit configuration file  
nano .env

Update the .env file with your settings:

# Database Configuration  
DB\_HOST=localhost  
DB\_PORT=3306  
DB\_NAME=kea\_dhcp  
DB\_USER=kea\_user  
DB\_PASSWORD=your\_secure\_password  
  
# Kea Configuration  
KEA\_CONFIG\_PATH=/etc/kea/kea-dhcp4.conf  
KEA\_CONTROL\_SOCKET=/tmp/kea4-ctrl-socket  
KEA\_LEASE\_FILE=/var/lib/kea/dhcp4.leases  
  
# Application Configuration  
RACK\_ENV=production  
PORT=4567  
LOG\_LEVEL=INFO  
  
# Security  
SESSION\_SECRET=your\_session\_secret\_here  
ADMIN\_USERNAME=admin  
ADMIN\_PASSWORD=your\_admin\_password

### 5. Configure Kea DHCP

Ensure your Kea configuration includes a control socket:

{  
 "Dhcp4": {  
 "control-socket": {  
 "socket-type": "unix",  
 "socket-name": "/tmp/kea4-ctrl-socket"  
 }  
 }  
}

## Deployment

### Development Mode

# Start in development mode  
rake dev

Access the application at: http://localhost:4567

### Production Deployment

#### Option 1: Direct Ruby Execution

# Start the application  
rake start

#### Option 2: Using Systemd Service

Create a systemd service file:

sudo nano /etc/systemd/system/kea-dhcp-manager.service

[Unit]  
Description=Kea DHCP Manager  
After=network.target mysql.service kea-dhcp4-server.service  
  
[Service]  
Type=simple  
User=www-data  
Group=www-data  
WorkingDirectory=/opt/kea-dhcp-manager  
Environment=RACK\_ENV=production  
ExecStart=/usr/local/bin/bundle exec rackup -p 4567 -o 0.0.0.0  
Restart=always  
RestartSec=10  
  
[Install]  
WantedBy=multi-user.target

Enable and start the service:

sudo systemctl enable kea-dhcp-manager  
sudo systemctl start kea-dhcp-manager  
sudo systemctl status kea-dhcp-manager

#### Option 3: Using Nginx Reverse Proxy

Install and configure Nginx:

sudo apt install nginx  
  
sudo nano /etc/nginx/sites-available/kea-dhcp-manager

server {  
 listen 80;  
 server\_name your-server-domain.com;  
   
 location / {  
 proxy\_pass http://127.0.0.1:4567;  
 proxy\_set\_header Host $host;  
 proxy\_set\_header X-Real-IP $remote\_addr;  
 proxy\_set\_header X-Forwarded-For $proxy\_add\_x\_forwarded\_for;  
 proxy\_set\_header X-Forwarded-Proto $scheme;  
 }  
}

Enable the site:

sudo ln -s /etc/nginx/sites-available/kea-dhcp-manager /etc/nginx/sites-enabled/  
sudo nginx -t  
sudo systemctl restart nginx

## Usage

### Initial Login

1. Open your web browser and navigate to the application URL
2. Use the admin credentials you configured in the .env file
3. You’ll be redirected to the dashboard upon successful login

### Managing Subnets

1. Navigate to **Subnets** from the main menu
2. Click **Add Subnet** to create a new subnet
3. Fill in the required information:
   * **Subnet CIDR**: Network address with CIDR notation (e.g., 192.168.1.0/24)
   * **IP Pool Range**: Available IP range for dynamic assignment
   * **Default Gateway**: Router/Gateway IP address (optional)
   * **DNS Servers**: Comma-separated DNS server IP addresses (optional)
4. Click **Add Subnet** to save

### Managing IP Reservations

1. Navigate to **Reservations** from the main menu
2. Click **Add Reservation** to create a new IP reservation
3. Fill in the required information:
   * **Subnet**: Choose the target subnet
   * **IP Address**: The IP address to reserve
   * **MAC Address**: MAC address of the device
   * **Hostname**: Device hostname (optional)
4. Click **Add Reservation** to save

### Configuration Management

1. Navigate to **Configuration** from the main menu
2. Use the available actions:
   * **Update with Database Reservations**: Sync database reservations to Kea configuration
   * **Validate Configuration**: Check configuration for errors
   * **Reload Kea**: Apply configuration changes
   * **Create Backup**: Backup current configuration

## Maintenance

### Common Tasks

# Check application status  
rake status  
  
# Create configuration backup  
rake backup\_config  
  
# Validate configuration  
rake validate\_config  
  
# Clean old logs and backups  
rake clean  
  
# View all available tasks  
rake help

### Log Files

* **Application logs**: logs/app.log
* **Kea manager logs**: logs/kea.log
* **Database logs**: logs/database.log
* **Configuration logs**: logs/config.log

### Backup Management

Configuration backups are automatically created in /etc/kea/backups/ with timestamps. The application keeps the last 10 backups automatically.

## Troubleshooting

### Common Issues

1. **Database Connection Failed**
   * Check MySQL service status: sudo systemctl status mysql
   * Verify database credentials in .env file
   * Ensure database and user exist
2. **Kea Control Socket Not Found**
   * Check Kea configuration for control socket
   * Verify socket path in .env file
   * Ensure Kea service is running: sudo systemctl status kea-dhcp4-server
3. **Permission Denied Errors**
   * Ensure application user has read access to Kea configuration
   * Check file permissions on log directories
   * Verify MySQL user permissions
4. **Configuration Validation Fails**
   * Check Kea configuration syntax
   * Validate JSON format
   * Review Kea logs for detailed errors

### Getting Help

1. Check the application logs for detailed error information
2. Verify system service status
3. Ensure all dependencies are properly installed
4. Check file permissions and ownership

## Security Considerations

1. **Change Default Credentials**: Always change the default admin username and password
2. **Use HTTPS**: Configure SSL/TLS for production deployments
3. **Firewall**: Restrict access to the web interface
4. **Regular Updates**: Keep the system and dependencies updated
5. **Backup Strategy**: Implement regular configuration and database backups

## Contributing

This application was created by MiniMax Agent. For issues or improvements, please check the application logs and system configuration.

## License

This project is provided as-is for educational and practical use. Please ensure compliance with your organization’s policies and applicable laws.

**Kea DHCP Manager** - Simplifying DHCP server management with modern web technologies.