

HOLLY 3.0

Hyper-Optimized Logic & Learning Yield

Developer Documentation

Complete Technical Reference & API Guide

Hollywood Productions

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HOLLY Developer Documentation

Complete Technical Guide v1.0

For: Developers, DevOps Engineers, System Architects

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1. Getting Started

1.1 Prerequisites

Required: - Node.js >= 18.0.0 - npm >= 9.0.0 - PostgreSQL >= 14.0 - Git

Recommended: - VS Code with extensions: - Prisma - ESLint - Prettier - TypeScript

1.2 Quick Start

```
# Clone the repository
git clone https://github.com/iamhollywoodpro/Holly-AI.git
cd Holly-AI

# Install dependencies
npm install

# Set up environment variables
cp .env.example .env.local
# Edit .env.local with your credentials

# Generate Prisma Client
npx prisma generate

# Push database schema
npx prisma db push

# Start development server
npm run dev

# Open http://localhost:3000
```

1.3 Environment Variables

Create `.env.local` with the following:

```
# Database
DATABASE_URL="postgresql://user:password@host:5432/dbname"

# Clerk Authentication
NEXT_PUBLIC_CLERK_PUBLISHABLE_KEY="pk_test_..."
CLERK_SECRET_KEY="sk_test_..."

# Clerk URLs
NEXT_PUBLIC_CLERK_SIGN_IN_URL="/sign-in"
NEXT_PUBLIC_CLERK_SIGN_UP_URL="/sign-up"
NEXT_PUBLIC_CLERK_AFTER_SIGN_IN_URL="/dashboard"
NEXT_PUBLIC_CLERK_AFTER_SIGN_UP_URL="/dashboard"

# Optional: External APIs
OPENAI_API_KEY="sk-..."
ANTHROPIC_API_KEY="sk-ant..."
```

2. Project Structure

```
Holly-AI/
├── app/                      # Next.js App Router
│   ├── api/                  # API Routes
│   │   ├── analytics/        # Analytics APIs
│   │   ├── creative/         # Creative APIs
│   │   ├── security/         # Security APIs
│   │   ├── moderation/       # Moderation APIs
│   │   ├── compliance/       # Compliance APIs
│   │   ├── audit/             # Audit APIs
│   │   └── orchestration/    # Orchestration APIs
│   ├── dashboard/             # Dashboard Pages
│   │   ├── page.tsx          # Main dashboard
│   │   ├── creative/          # Creative studio
│   │   ├── analytics/         # Analytics dashboard
│   │   ├── security/          # Security center
│   │   └── orchestration/     # Orchestration hub
│   ├── (auth)/                # Auth pages
│   ├── layout.tsx              # Root layout
│   └── page.tsx                # Home page
|
└── src/
    ├── components/            # React Components
    │   ├── dashboard/          # Dashboard-specific
    │   │   ├── ui/              # UI primitives
    │   │   ├── charts/          # Chart components
    │   │   ├── metrics/          # Metric displays
    │   │   ├── layout/           # Layout components
    │   │   ├── notifications/    # Notifications
    │   │   └── workflow/          # Workflow builder
    │   └── [feature]/           # Feature components
    |
    ├── lib/                   # Core Libraries
    │   ├── analytics/          # Analytics Engine
    │   │   ├── metrics-aggregator.ts
    │   │   ├── report-generator.ts
    │   │   ├── dashboard-builder.ts
    │   │   └── insights-engine.ts
    │   ├── creative/            # Creative Engine
    │   │   ├── asset-manager.ts
    │   │   └── content-generator.ts
```

```
|   |   |   └── image-generator.ts
|   |   └── template-manager.ts
|   ├── security/          # Security System
|   |   ├── audit-logger.ts
|   |   ├── security-monitor.ts
|   |   ├── content-moderator.ts
|   |   └── compliance-manager.ts
|   ├── orchestration/     # Orchestration Engine
|   |   ├── agent-coordinator.ts
|   |   ├── workflow-engine.ts
|   |   ├── task-scheduler.ts
|   |   └── resource-allocator.ts
|   ├── api/               # API Clients
|   |   ├── client.ts
|   |   ├── analytics.ts
|   |   ├── creative.ts
|   |   ├── security.ts
|   |   └── orchestration.ts
|   └── websocket/         # WebSocket
|       └── notifications.ts
|
|   └── hooks/             # React Hooks
|       ├── useAnalytics.ts
|       ├── useCreative.ts
|       ├── useSecurity.ts
|       └── useOrchestration.ts
|
|   └── utils/              # Utility functions
|
└── prisma/
    └── schema.prisma      # Database schema
|
└── public/               # Static assets
|
└── docs/                 # Documentation
    ├── HOLLY_WHITE_PAPER.md
    ├── HOLLY_INVESTOR_PITCH.md
    └── DEVELOPER_DOCUMENTATION.md
|
└── .env.local            # Environment variables
```

```
|── next.config.mjs          # Next.js config  
|── tailwind.config.ts      # Tailwind config  
|── tsconfig.json           # TypeScript config  
└── package.json            # Dependencies
```

3. Development Setup

3.1 Local Development

```
# Install dependencies  
npm install  
  
# Generate Prisma Client  
npx prisma generate  
  
# Start dev server (with hot reload)  
npm run dev  
  
# Run in production mode  
npm run build  
npm start  
  
# Check TypeScript types  
npm run type-check  
  
# Lint code  
npm run lint  
  
# Format code  
npm run format
```

3.2 Database Setup

Option 1: Local PostgreSQL

```
# Install PostgreSQL (macOS)
brew install postgresql@14
brew services start postgresql@14

# Create database
createdb holly_dev

# Update .env.local
DATABASE_URL="postgresql://localhost:5432/holly_dev"
```

Option 2: Neon (Recommended)

1. Sign up at <https://neon.tech>
2. Create a new project
3. Copy connection string to `DATABASE_URL`

Push Schema:

```
# Push schema to database
npx prisma db push

# Generate Prisma Client
npx prisma generate

# Open Prisma Studio (database GUI)
npx prisma studio
```

3.3 Authentication Setup

Clerk Setup:

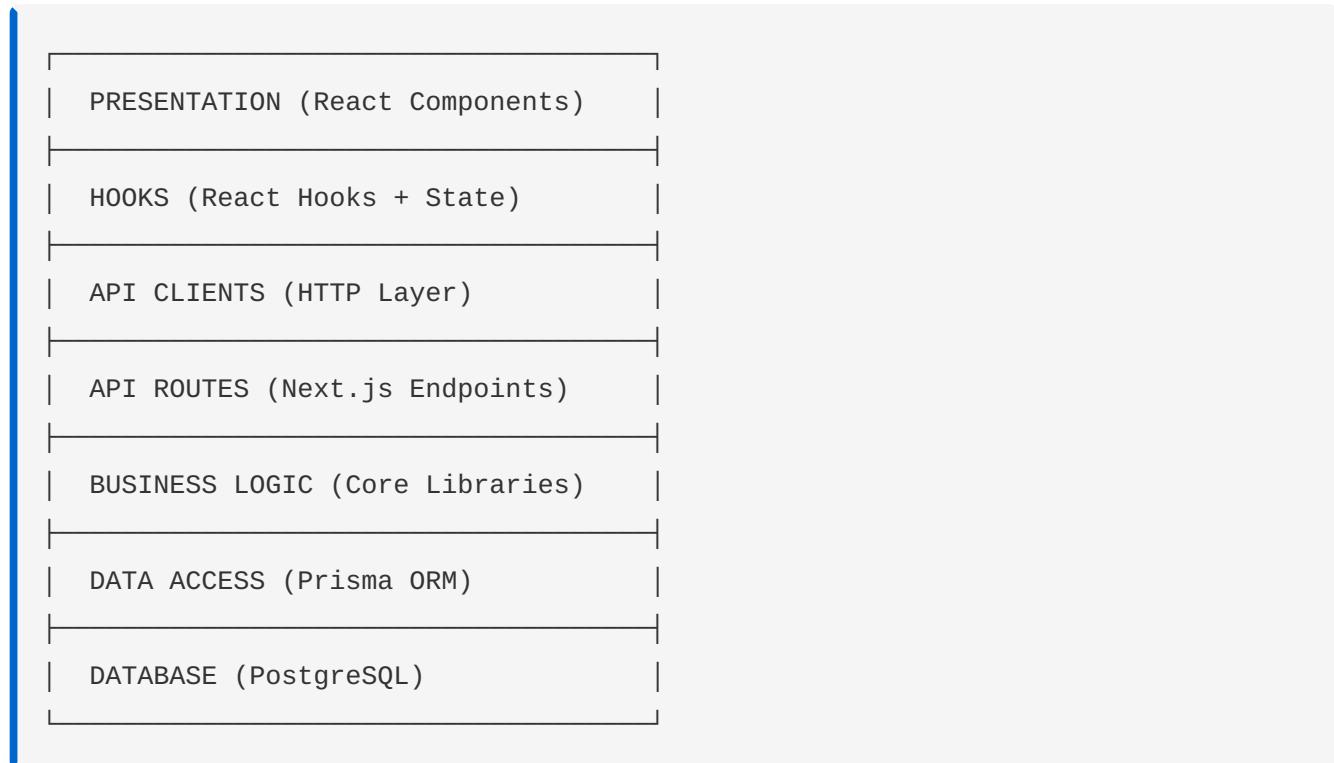
1. Sign up at <https://clerk.com>
2. Create a new application
3. Copy API keys to `.env.local : env`

```
NEXT_PUBLIC_CLERK_PUBLISHABLE_KEY="pk_test_..."
CLERK_SECRET_KEY="sk_test_..."
```
4. Configure sign-in/up URLs in Clerk Dashboard

4. Core Concepts

4.1 Architecture Overview

HOLLY follows a **layered architecture**:



4.2 Data Flow

Frontend → Backend:

```
// 1. Component calls hook
const { create, loading } = useCreativeAsset();

// 2. Hook calls API client
await create({ name: 'My Asset', type: 'image' });

// 3. API client makes HTTP request
const response = await apiClient.post('/creative/assets', data);

// 4. API route authenticates & validates
const { userId } = await auth();
if (!userId) return unauthorized();

// 5. Business logic processes request
const asset = await assetManager.createAsset(userId, data);

// 6. Prisma ORM persists to database
await prisma.creativeAsset.create({ data });

// 7. Response flows back up the chain
return NextResponse.json({ success: true, asset });
```

4.3 Type Safety

HOLLY is 100% TypeScript:

```
// Types are defined at database level (Prisma)
model CreativeAsset {
  id  String @id @default(cuid())
  name String
  type String
  // ...
}

// Generated by Prisma
import { CreativeAsset } from '@prisma/client';

// Used in API layer
export interface Asset extends CreativeAsset {
  // Additional fields
}

// Used in frontend
const asset: Asset = await getAsset(id);
```

5. API Reference

5.1 API Conventions

Base URL: `/api`

Authentication: Clerk session (automatic)

Content-Type: `application/json`

Response Format: JSON

Standard Responses:

```
// Success
{
  "success": true,
  "data": { /* ... */ }
}

// Error
{
  "error": "Error message",
  "code": "ERROR_CODE"
}
```

5.2 Creative APIs

Generate Image

```
POST /api/creative/image/generate
```

Request:

```
{
  "prompt": "A futuristic cityscape at sunset",
  "model": "dall-e-3",
  "width": 1024,
  "height": 1024
}
```

Response:

```
{
  "success": true,
  "jobId": "job_abc123"
}
```

List Assets

```
GET /api/creative/assets?type=image&limit=10
```

Response:

```
{  
  "assets": [  
    {  
      "id": "asset_123",  
      "name": "My Image",  
      "type": "image",  
      "url": "https://...",  
      "createdAt": "2025-12-06T..."  
    }  
  ]  
}
```

Delete Asset

```
DELETE /api/creative/asset/[id]
```

Response:

```
{  
  "success": true  
}
```

5.3 Analytics APIs

Create Metric

```
POST /api/analytics/metrics
```

Request:

```
{  
  "name": "user_signups",  
  "metricType": "counter",  
  "category": "growth"  
}
```

Response:

```
{  
  "success": true,  
  "metricId": "metric_abc123"  
}
```

Get Metrics

```
GET /api/analytics/metrics?category=growth&limit=10
```

Response:

```
{  
  "metrics": [  
    {  
      "id": "metric_123",  
      "name": "user_signups",  
      "value": 1250,  
      "trend": "up",  
      "changePercent": 15.3  
    }  
  ]  
}
```

Generate Report

```
POST /api/analytics/reports
```

Request:

```
{  
  "name": "Monthly Revenue Report",  
  "type": "revenue",  
  "config": {  
    "dateRange": "last_30_days"  
  }  
}
```

Response:

```
{  
  "success": true,  
  "reportId": "report_abc123"  
}
```

5.4 Security APIs

Get Security Report

```
GET /api/security/report
```

Response:

```
{  
  "securityScore": 98,  
  "activeThreats": 0,  
  "blockedRequests": 127,  
  "recentEvents": [  
    {  
      "type": "rate_limit_exceeded",  
      "severity": "medium",  
      "timestamp": "2025-12-06T..."  
    }  
  ]  
}
```

Moderate Content

```
POST /api/moderation/check
```

Request:

```
{  
  "content": "Text to moderate",  
  "type": "text"  
}
```

Response:

```
{  
  "safe": true,  
  "reason": null  
}
```

5.5 Orchestration APIs

Create Agent

```
POST /api/orchestration/agents
```

Request:

```
{  
  "name": "Code Generator",  
  "type": "creative",  
  "capabilities": ["code_generation", "testing"]  
}
```

Response:

```
{  
  "success": true,  
  "agentId": "agent_abc123"  
}
```

Execute Workflow

```
POST /api/orchestration/workflows/[id]/execute
```

Response:

```
{  
  "success": true,  
  "workflow": {  
    "id": "workflow_123",  
    "status": "running",  
    "progress": 25  
  }  
}
```

6. Database Schema

6.1 Prisma Basics

Schema Definition:

```
model User {  
  id          String  @id @default(cuid())  
  clerkUserId String  @unique  
  email       String  @unique  
  name        String?  
  createdAt   DateTime @default(now())  
  updatedAt   DateTime @updatedAt  
  
  // Relations  
  assets CreativeAsset[]  
  
  @@map("users")  
}
```

Generated TypeScript Type:

```
type User = {
  id: string;
  clerkUserId: string;
  email: string;
  name: string | null;
  createdAt: Date;
  updatedAt: Date;
}
```

6.2 Common Queries

Create:

```
const user = await prisma.user.create({
  data: {
    clerkUserId: userId,
    email: 'user@example.com',
    name: 'John Doe'
  }
});
```

Read:

```
// Find unique
const user = await prisma.user.findUnique({
  where: { clerkUserId: userId }
});

// Find many
const assets = await prisma.creativeAsset.findMany({
  where: { userId: user.id },
  orderBy: { createdAt: 'desc' },
  take: 10
});
```

Update:

```
const updated = await prisma.user.update({
  where: { id: userId },
  data: { name: 'New Name' }
});
```

Delete:

```
await prisma.creativeAsset.delete({
  where: { id: assetId }
});
```

Relations:

```
// Include related data
const user = await prisma.user.findUnique({
  where: { id: userId },
  include: {
    assets: true,
    projects: true
  }
});
```

6.3 Migrations

Development:

```
# Make schema changes in schema.prisma

# Push changes (development only)
npx prisma db push

# Generate client
npx prisma generate
```

Production:

```
# Create migration
npx prisma migrate dev --name add_new_field

# Apply migrations (CI/CD)
npx prisma migrate deploy
```

7. Authentication

7.1 Clerk Integration

Frontend (Client Component):

```
'use client';

import { useUser } from '@clerk/nextjs';

export function ProfileButton() {
  const { user, isSignedIn } = useUser();

  if (!isSignedIn) {
    return <SignInButton />;
  }

  return <div>Hello, {user.firstName}</div>;
}
```

Backend (API Route):

```

import { auth } from '@clerk/nextjs/server';
import { NextRequest, NextResponse } from 'next/server';

export async function GET(req: NextRequest) {
  const { userId } = await auth();

  if (!userId) {
    return NextResponse.json(
      { error: 'Unauthorized' },
      { status: 401 }
    );
  }

  // User is authenticated
  const data = await fetchUserData(userId);
  return NextResponse.json(data);
}

```

7.2 Protected Routes

Middleware:

```

// middleware.ts
import { clerkMiddleware } from '@clerk/nextjs/server';

export default clerkMiddleware();

export const config = {
  matcher: [
    '/((?!_next|[^?]*\\.\\.(?:html?|css|js(?!on)|jpe?g|webp|png|gif|svg|ttf|woff2?)|ico|csv|d|'
    '(api|trpc)(.*))',
    ],
  };

```

Page-Level Protection:

```
// app/dashboard/page.tsx

import { auth } from '@clerk/nextjs/server';
import { redirect } from 'next/navigation';

export default async function DashboardPage() {
  const { userId } = await auth();

  if (!userId) {
    redirect('/sign-in');
  }

  return <Dashboard userId={userId} />;
}
```

8. Frontend Development

8.1 Component Structure

Example Component:

```
'use client';

import { useState } from 'react';
import { Card, CardHeader, CardTitle,CardContent } from '@/components/ui/Card';
import { Button } from '@/components/ui/Button';
import { useCreativeAsset } from '@/hooks/useCreative';

export function AssetList() {
  const { assets, loading, error, deleteAsset } = useCreativeAsset();
  const [selectedId, setSelectedId] = useState<string | null>(null);

  if (loading) {
    return <LoadingSpinner />;
  }

  if (error) {
    return <ErrorMessage error={error} />;
  }

  return (
    <Card>
      <CardHeader>
        <CardTitle>Assets</CardTitle>
      </CardHeader>
      <CardContent>
        <div className="grid gap-4">
          {assets.map((asset) => (
            <AssetCard
              key={asset.id}
              asset={asset}
              onDelete={() => deleteAsset(asset.id)}
            />
          )));
        </div>
      </CardContent>
    </Card>
  );
}
```

8.2 Custom Hooks

Pattern:

```
// src/hooks/useResource.ts

import { useState, useEffect, useCallback } from 'react';
import * as api from '@/lib/api/resource';

export function useResource() {
  const [data, setData] = useState([]);
  const [loading, setLoading] = useState(true);
  const [error, setError] = useState<string | null>(null);

  const fetchData = useCallback(async () => {
    setLoading(true);
    setError(null);
    try {
      const result = await api.getResources();
      setData(result);
    } catch (err: any) {
      setError(err.message);
    } finally {
      setLoading(false);
    }
  }, []);

  useEffect(() => {
    fetchData();
  }, [fetchData]);

  const create = useCallback(async (newData: any) => {
    const result = await api.createResource(newData);
    setData(prev => [...prev, result]);
    return result;
  }, []);

  const deleteResource = useCallback(async (id: string) => {
    await api.deleteResource(id);
    setData(prev => prev.filter(item => item.id !== id));
  }, []);

  return {
    data,
    loading,
```

```

    error,
    fetchData,
    create,
    delete: deleteResource
  );
}

}

```

8.3 Styling with Tailwind

Best Practices:

```

// Use className prop
<div className="flex items-center gap-4 rounded-lg bg-white p-4 shadow">
  <h2 className="text-xl font-semibold text-gray-900">Title</h2>
  <p className="text-sm text-gray-600">Description</p>
</div>

// Responsive design
<div className="grid grid-cols-1 gap-4 md:grid-cols-2 lg:grid-cols-3">
  {/* Content */}
</div>

// Hover states
<button className="rounded-lg bg-purple-600 px-4 py-2 text-white hover:bg-purple-700 active:bg-purple-800">
  Click Me
</button>

// Dark mode (if implemented)
<div className="bg-white dark:bg-gray-800 text-gray-900 dark:text-white">
  Content
</div>

```

9. Backend Development

9.1 Creating API Routes

File Structure:

```
app/api/resource/route.ts          # GET /api/resource, POST /api/resource  
app/api/resource/[id]/route.ts    # GET /api/resource/:id, PATCH, DELETE
```

Example Route:

```
// app/api/resource/route.ts

import { auth } from '@clerk/nextjs/server';
import { NextRequest, NextResponse } from 'next/server';
import { prisma } from '@/lib/prisma';

// GET /api/resource
export async function GET(req: NextRequest) {
  try {
    const { userId } = await auth();
    if (!userId) {
      return NextResponse.json(
        { error: 'Unauthorized' },
        { status: 401 }
      );
    }

    const resources = await prisma.resource.findMany({
      where: { userId }
    });

    return NextResponse.json({ resources });
  } catch (error) {
    console.error('GET /api/resource error:', error);
    return NextResponse.json(
      { error: 'Internal server error' },
      { status: 500 }
    );
  }
}

// POST /api/resource
export async function POST(req: NextRequest) {
  try {
    const { userId } = await auth();
    if (!userId) {
      return NextResponse.json(
        { error: 'Unauthorized' },
        { status: 401 }
      );
    }
  }
}
```

```
const body = await req.json();

// Validate input
if (!body.name) {
    return NextResponse.json(
        { error: 'Name is required' },
        { status: 400 }
    );
}

const resource = await prisma.resource.create({
    data: {
        userId,
        name: body.name,
        type: body.type || 'default'
    }
});

return NextResponse.json({
    success: true,
    resource
});
} catch (error) {
    console.error('POST /api/resource error:', error);
    return NextResponse.json(
        { error: 'Internal server error' },
        { status: 500 }
    );
}
}
```

9.2 Business Logic Libraries

Pattern:

```
// src/lib/feature/manager.ts

import { prisma } from '@/lib/prisma';

export class ResourceManager {

    /**
     * Get resources for a user
     */
    async getUserResources(userId: string) {
        return prisma.resource.findMany({
            where: { userId },
            orderBy: { createdAt: 'desc' }
        });
    }

    /**
     * Create a new resource
     */
    async createResource(userId: string, data: {
        name: string;
        type: string;
    }) {
        // Business logic validation
        if (data.name.length < 3) {
            throw new Error('Name must be at least 3 characters');
        }

        return prisma.resource.create({
            data: {
                userId,
                ...data
            }
        });
    }

    /**
     * Delete a resource
     */
    async deleteResource(userId: string, resourceId: string) {
        // Check ownership
        const resource = await prisma.resource.findUnique({
```

```
    where: { id: resourceId }
  });

  if (!resource || resource.userId !== userId) {
    throw new Error('Resource not found or unauthorized');
  }

  return prisma.resource.delete({
    where: { id: resourceId }
  });
}

// Singleton instance
export const resourceManager = new ResourceManager();
```

10. Testing

10.1 Unit Tests

Setup:

```
npm install --save-dev jest @testing-library/react @testing-library/jest-dom
```

Example Test:

```
// src/lib/utils/calculator.test.ts
import { calculate } from './calculator';

describe('Calculator', () => {
  test('adds two numbers', () => {
    expect(calculate(2, 3, 'add')).toBe(5);
  });

  test('handles division by zero', () => {
    expect(() => calculate(5, 0, 'divide')).toThrow('Division by zero');
  });
});
```

10.2 Integration Tests

Example:

```
// __tests__/api/resource.test.ts
import { GET, POST } from '@app/api/resource/route';
import { NextRequest } from 'next/server';

describe('Resource API', () => {
  test('GET returns resources', async () => {
    const req = new NextRequest('http://localhost/api/resource');
    const response = await GET(req);
    const data = await response.json();

    expect(response.status).toBe(200);
    expect(data).toHaveProperty('resources');
  });
});
```

10.3 E2E Tests

Using Playwright:

```
// tests/e2e/dashboard.spec.ts
import { test, expect } from '@playwright/test';

test('dashboard loads correctly', async ({ page }) => {
    await page.goto('http://localhost:3000/dashboard');

    await expect(page.locator('h1')).toContainText('Dashboard');
    await expect(page.locator('[data-testid="metric-card"]')).toHaveCount(4);
});
```

11. Deployment

11.1 Vercel Deployment

Automatic (Recommended):

1. Push code to GitHub
2. Import project in Vercel
3. Configure environment variables
4. Deploy automatically on push to main

Manual:

```
# Install Vercel CLI
npm i -g vercel

# Login
vercel login

# Deploy
vercel

# Deploy to production
vercel --prod
```

11.2 Environment Variables

Add in Vercel Dashboard: - Settings → Environment Variables - Add all variables from `.env.local` - Redeploy after adding variables

11.3 Database Migrations

Production Migration:

```
# In vercel-build script (package.json)
"vercel-build": "prisma db push --accept-data-loss && prisma generate && next build"
```

Note: Use `prisma migrate deploy` for production migrations with proper migration history.

12. Troubleshooting

12.1 Common Issues

Issue: Prisma Client not generated

```
# Solution
npx prisma generate
```

Issue: Database connection failed

```
# Check DATABASE_URL in .env.local
# Test connection
npx prisma db push
```

Issue: Authentication not working

```
# Verify Clerk keys in .env.local
# Check Clerk Dashboard settings
# Clear browser cookies
```

Issue: Build fails on Vercel

```
# Check build logs
# Ensure all env vars are set
# Run build locally: npm run build
```

12.2 Debug Mode

Enable verbose logging:

```
// Add to api routes
console.log('[DEBUG]', { userId, data });
```

Prisma query logging:

```
// prisma/client.ts
const prisma = new PrismaClient({
  log: ['query', 'info', 'warn', 'error']
});
```

12.3 Performance Optimization

Database: - Add indexes for frequently queried fields - Use `select` to limit returned fields - Implement pagination

Frontend: - Use `React.memo` for expensive components - Implement virtual scrolling for large lists - Lazy load images and components

API: - Implement caching (React Query) - Use SWR for real-time data - Optimize database queries

13. Best Practices

13.1 Code Organization

□ **DO:** - One component per file - Group related files in folders - Use index files for exports - Keep components under 300 lines

□ **DON'T:** - Mix business logic in components - Create deeply nested folder structures - Use relative imports (`../../../../`)

13.2 TypeScript

□ **DO:** - Define explicit return types - Use interfaces for objects - Leverage type inference - Use generics when appropriate

□ **DON'T:** - Use `any` type - Disable type checking - Ignore TypeScript errors

13.3 Security

□ **DO:** - Validate all user input - Use parameterized queries - Implement rate limiting - Log security events

□ **DON'T:** - Trust client-side data - Expose sensitive data - Skip authentication checks - Store secrets in code

14. Resources

Official Documentation

- Next.js: <https://nextjs.org/docs>
- Prisma: <https://www.prisma.io/docs>
- Clerk: <https://clerk.com/docs>
- Tailwind CSS: <https://tailwindcss.com/docs>

Community

- GitHub Issues: Report bugs
- Discord: Community support
- Twitter: Updates and announcements

Contact

Technical Support: [Support Email]

Documentation: [Docs URL]

GitHub: <https://github.com/iamhollywoodpro/Holly-AI>

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