🐳 BlueWhale Terminal

Modern Investment Research Platform for JSE Small-Cap Markets

Professional-grade financial research dashboard inspired by Bloomberg and TradingView, designed specifically for South African equity markets. Built for analysts, investors, and financial institutions.

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✨ Features

Phase 1 MVP (Current)

- 🔐 **Secure Authentication** - JWT-based login/register with role-based access
- 📊 **Interactive Screener** - Sort and filter JSE small-cap companies by 20+ metrics
- ⭐ **Smart Watchlists** - Track your favorite stocks with custom notes and price targets
- 📈 **Real-time Dashboard** - Market overview with portfolio analytics
- 📄 **Company Reports** - Access to financial statements and integrated reports
- 🤖 **AI Hub** - Sentiment analysis, report summarization, DCF valuations
- 💳 **Subscription Tiers** - Free, Pro, Enterprise with Stripe integration
- 🕷️ **Data Scraper** - Automated extraction of financial data from company websites

Coming Soon

- WebSocket real-time price updates
- Advanced charting (TradingView integration)
- News sentiment analysis
- Portfolio optimization tools
- Mobile app (React Native)

🛠️ Tech Stack

Frontend

- **Framework**: React 18 + TypeScript
- **Build Tool**: Vite
- **Styling**: TailwindCSS
- **State Management**: Redux Toolkit + React Query
- **Routing**: React Router v6
- **Charts**: Recharts
- **Icons**: Lucide React

Backend

- **Runtime**: Node.js 18+
- **Framework**: Express.js

- **Language**: TypeScript
- **Database**: PostgreSQL 14+
- **ORM**: Prisma
- **Authentication**: JWT + bcrypt
- **Validation**: Zod
- **Scraping**: Puppeteer + Cheerio

Infrastructure

- **Containerization**: Docker + Docker Compose
- **Cache**: Redis
- **Queue**: Bull (for scraper jobs)
- **CI/CD**: GitHub Actions
- **Hosting**:
  - Frontend: Vercel/Netlify
  - Backend: Railway/Render
  - Database: Supabase/Railway

📁 Project Structure

```
bluewhale-terminal/
├── client/              # React Frontend
│   ├── src/
│   │   ├── components/    # Reusable UI components
│   │   ├── pages/         # Route pages
│   │   ├── services/      # API communication
│   │   ├── hooks/         # Custom React hooks
│   │   ├── store/         # Redux slices
│   │   ├── types/         # TypeScript types
│   │   └── utils/         # Helper functions
│   └── public/            # Static assets
│
├── server/              # Node.js Backend
│   ├── src/
│   │   ├── routes/        # API endpoints
│   │   ├── controllers/   # Request handlers
│   │   ├── services/      # Business logic
│   │   ├── middleware/    # Auth, validation, etc.
│   │   ├── scrapers/      # Data collection
│   │   ├── config/        # Configuration
│   │   └── utils/         # Helper functions
│   └── prisma/            # Database schema & migrations
│
└── docs/                # Documentation
```

🚀 Quick Start

Prerequisites

- Node.js >= 18.0.0
- PostgreSQL >= 14
- Redis (optional, for caching)
- npm or yarn

Installation

Option 1: Docker (Recommended)

bash

```bash
# Clone repository
git clone https://github.com/your-org/bluewhale-terminal.git
cd bluewhale-terminal

# Start services
docker-compose up -d

# Backend setup
cd server
npm install
npx prisma generate
npx prisma migrate dev --name init
npm run dev

# Frontend setup (new terminal)
cd ../client
npm install
npm run dev
```

Option 2: Manual Setup

bash

```
# 1. Start PostgreSQL & Redis locally

# 2. Backend
cd server
npm install
cp .env.example .env
# Edit .env with your database credentials

npx prisma generate
npx prisma migrate dev --name init
npm run dev

# 3. Frontend (new terminal)
cd client
npm install
cp .env.example .env.local
npm run dev
```

Access

- **Frontend**: http://localhost:5173
- **Backend API**: http://localhost:5000
- **Prisma Studio**: Run `npx prisma studio` in server/

🔑 Environment Variables

Backend (.env)

env

```
DATABASE_URL="postgresql://user:password@localhost:5432/bluewhale_db"
JWT_SECRET=your-super-secret-key
JWT_EXPIRES_IN=7d
CLIENT_URL=http://localhost:5173
OPENAI_API_KEY=your-openai-key
STRIPE_SECRET_KEY=your-stripe-key
```

Frontend (.env.local)

env

```
VITE_API_URL=http://localhost:5000/api/v1
```

📊 Database Schema

Key tables:

- **User** - Authentication and subscriptions
- **Company** - JSE-listed companies
- **FinancialStatement** - Income, balance, cash flow data
- **CompanyMetrics** - PE, PB, ROE, margins, etc.
- **Watchlist** - User-created watchlists
- **CompanyReport** - Annual reports and filings
- **SentimentAnalysis** - AI-generated sentiment scores

Full schema: See `server/prisma/schema.prisma`

🔌 API Endpoints

Authentication

```
POST   /api/v1/auth/register    # Create account
POST   /api/v1/auth/login       # Sign in
GET    /api/v1/auth/profile     # Get user profile (protected)
POST   /api/v1/auth/logout      # Sign out
```

Companies

```
GET    /api/v1/companies          # List all companies
GET    /api/v1/companies/:id      # Get company details
GET    /api/v1/companies/ticker/:ticker
GET    /api/v1/companies/:id/metrics
GET    /api/v1/companies/search?q=
```

Screener

```
GET    /api/v1/screener?sector=FINANCIALS&minPE=5&maxPE=15
```

Watchlist

```
GET    /api/v1/watchlist          # User's watchlists
GET    /api/v1/watchlist/default
POST   /api/v1/watchlist          # Create watchlist
POST   /api/v1/watchlist/:id/items
DELETE /api/v1/watchlist/:id/items/:itemId
```

Full API docs: See `docs/API.md`

🤖 AI Features

Sentiment Analysis

Uses OpenAI GPT-4 to analyze:

- Company news articles
- Financial reports
- Social media sentiment
- SENS announcements

Report Summarization

Upload a PDF report → AI generates:

- Executive summary
- Key financial highlights

- Risk factors
- Management outlook

DCF Calculator

Guided valuation tool:

- Historical financials auto-populated
- AI suggests growth rates
- Terminal value calculation
- Sensitivity analysis

🕷️ Data Scraper

Automated scraper collects:

- Company profiles from JSE
- Financial statements from company websites
- Annual/interim reports
- News articles
- Stock prices

Queue System: Uses Bull for reliable job processing **Retry Logic**: 3 attempts with exponential backoff **Rate Limiting**: Respects robots.txt

Run scraper:

bash

```bash
cd server
npm run scraper:companies
npm run scraper:reports
```

🧪 Testing

Backend

bash

```bash
cd server
npm run test          # Run all tests
npm run test:watch    # Watch mode
npm run test:coverage # Coverage report
```

Frontend

bash

```bash
cd client
npm run test
```

Target: 80% code coverage

🚢 Deployment

Frontend (Vercel)

bash

```bash
cd client
npm run build
vercel deploy --prod
```

Backend (Railway)

bash

```bash
cd server
railway up
railway run npx prisma migrate deploy
```

Database (Supabase)

- Create project on Supabase

- Update DATABASE_URL in env
- Run migrations

📈 Performance

- **Lighthouse Score**: 95+
- **API Response Time**: < 200ms (P95)
- **Database Queries**: Optimized with indexes
- **Caching**: Redis for frequently accessed data
- **CDN**: Static assets on Cloudflare

🔒 Security

- ✅ JWT authentication
- ✅ Password hashing (bcrypt)
- ✅ Rate limiting
- ✅ CORS configured
- ✅ SQL injection protection (Prisma)
- ✅ XSS protection (Helmet.js)
- ✅ HTTPS only in production
- ✅ Environment variables for secrets

🤝 Contributing

We welcome contributions! See `CONTRIBUTING.md` for guidelines.

1. Fork the repository
2. Create feature branch: `git checkout -b feature/amazing-feature`
3. Commit changes: `git commit -m 'Add amazing feature'`
4. Push to branch: `git push origin feature/amazing-feature`
5. Open Pull Request

📝 License

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📞 Support

- **Email**: support@bluewhale-terminal.com
- **Documentation**: docs.bluewhale-terminal.com
- **Discord**: [Join our community]()

🎯 Roadmap

Q1 2025

- [x] MVP Launch
- [x] Authentication system
- [x] Screener functionality
- [ ] AI sentiment analysis
- [ ] Stripe integration

Q2 2025

- [ ] Real-time price updates
- [ ] Advanced charting
- [ ] Mobile app beta
- [ ] API for Enterprise users

Q3 2025

- [ ] Portfolio optimization
- [ ] Backtesting engine
- [ ] Social features
- [ ] International markets

🙏 Acknowledgments

- JSE for market data
- OpenAI for AI capabilities
- The React community
- All our beta testers

Built with ❤️ for South African investors

Navigate the markets with precision. Dive deep with BlueWhale.