# TestSpec Studio - Product Documentation

**Version:** 1.2.0 **Last Updated:** January 2025 **Document Type:** Product Feature Documentation

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## Product Overview

TestSpec Studio is an AI-powered test case generation platform that transforms user stories and acceptance criteria into comprehensive, ready-to-use test suites. The platform combines artificial intelligence with professional testing frameworks to automate the creation of both manual test cases and automation test skeletons.

### Key Value Propositions

- **Time Savings**: Reduce test case creation time from hours to minutes
- **AI-Powered Intelligence**: Leverage Google Gemini AI for context-aware test generation
- **Framework Flexibility**: Support for Playwright, Jest, and other popular frameworks
- **Enterprise-Ready**: Built-in user management, authentication, and admin controls
- **Professional Exports**: Multiple export formats for seamless integration with existing workflows

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## Core Features

### 1. AI-Powered Test Generation

**Description**: Transform natural language user stories into comprehensive test suites using Google Gemini AI.

**How It Works**:

- User inputs a user story or acceptance criteria
- Selects preferred automation framework (Playwright/Jest)
- AI analyzes the story and generates:
  - Manual test cases with step-by-step instructions
  - Automation test skeletons with proper structure
  - Edge cases and negative scenarios
  - Data validation tests

**Benefits**:

- Intelligent understanding of context and requirements
- Consistent test case format across the organization
- Coverage of positive, negative, and edge case scenarios
- Framework-specific code generation

**Free Tier Limits** (Google Gemini):

- 15 requests per minute
- 1 million tokens per minute
- 1,500 requests per day
- Completely FREE forever

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### 2. Multi-Framework Support

**Supported Frameworks**:

- **Playwright**: Modern end-to-end testing framework
- **Jest**: JavaScript testing framework for unit and integration tests

**Framework-Specific Features**:

- Proper test structure and syntax
- Framework-specific assertions
- Best practices implementation
- Ready-to-run test skeletons

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### 3. Test History & Tracking

**Description**: All generated tests are automatically saved to user's history with full tracking.

**Tracked Information**:

- User story/requirements input
- Selected framework
- Generated manual test cases
- Generated automation skeletons
- Timestamp of generation
- User who created the tests

**Features**:

- View past test generations
- Track testing activity over time
- Analyze testing patterns
- Audit trail for compliance

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## User Roles & Permissions

### Regular User

**Capabilities**:

- Create account and authenticate
- Generate test cases from user stories
- View personal test history

- Export tests in multiple formats
- Manage personal account settings
- Track active sessions

**Restrictions**:

- Can only view own test history
- Cannot access other users' data
- No administrative capabilities

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### Super Admin

**Capabilities**:

- **All Regular User capabilities**, plus:
- View all users in the system
- Search and filter users
- View detailed user statistics
- Ban/unban user accounts
- Reset user passwords
- Delete user data
- View all test history across users
- Track user sessions system-wide
- Access activity logs
- Enterprise-level controls

**Access**:

- Super Admin dashboard at `/admin`
- Requires `super_admin` role in database
- Protected by authentication and role checks

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## Authentication System

### Supported Authentication Methods

#### 1. Email/Password Authentication

- Traditional username/password login
- Secure password hashing with bcrypt
- Password reset functionality
- Email verification support

#### 2. Google OAuth

- One-click Google sign-in
- No password management required
- Secure OAuth 2.0 implementation
- Automatic profile sync

#### 3. GitHub OAuth

- Developer-friendly authentication
- GitHub account integration
- Automatic profile creation

- OAuth 2.0 standard

### Security Features

- **Row Level Security (RLS)**: Database-level access control
- **Secure Sessions**: JWT-based session management
- **Session Tracking**: Monitor active user sessions
- **Device Information**: Track login devices
- **Password Reset**: Secure password recovery flow
- **Auto-logout**: Automatic session expiration

### User Profile Management

**Automatic Profile Creation**:

- Email synced from auth provider
- Creation timestamp
- Last sign-in tracking
- Provider information (email/google/github)

**Profile Data**:

- User ID (unique)
- Email address
- Created date
- Last sign-in date
- Authentication provider
- Ban status (if applicable)

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## Test Generation Features

### Input Methods

**User Story Input**:

- Large text area for story/criteria
- Support for multi-line input
- Paste from external sources
- Clear and intuitive interface

**Framework Selection**:

- Dropdown selection
- Playwright or Jest options
- Framework-specific generation

### Generated Outputs

#### 1. Manual Test Cases

**Structure**:

- Test case ID and title
- Priority level (High/Medium/Low)
- Test steps with numbered sequence
- Expected results for each step

- Preconditions
- Test data requirements

**Format**:

- Clean, professional presentation
- Easy to read and follow
- Ready for test management tools
- Print-friendly layout

**2. Automation Test Skeletons**

**Features**:

- Framework-specific syntax
- Proper test structure
- Setup and teardown code
- Assertion examples
- Comments and documentation
- Best practices implementation

**Code Quality**:

- Syntax highlighted display
- Copy-to-clipboard functionality
- Ready to run with minimal changes
- Professional formatting

**3. Preview & Review**

**Tabs Interface**:

- **Manual Test Cases Tab**: View all generated test scenarios
- **Automation Skeletons Tab**: See automation code
- **Preview Bundle Tab**: Preview exports before download

**Review Features**:

- Side-by-side comparison
- Easy navigation between sections
- Responsive design for mobile/desktop

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# Admin Dashboard

## Overview Statistics

**Dashboard Metrics**:

- **Total Users**: Count of registered users
- **Total Tests Generated**: System-wide test count
- **Active Sessions**: Current active user sessions

**Visual Design**:

- Modern card-based layout
- Real-time data updates
- Neon-themed UI with purple accents

- Professional enterprise appearance

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## User Management

### User List Panel

**Features**:

- Search by email or user ID
- Filter by status (All/Active/Banned)
- Real-time search results
- User details preview

**Displayed Information**:

- User email (prominent display)
- User ID (truncated for readability)
- Test count
- Session count
- Ban status indicator (🚫 for banned users)

**Interactions**:

- Click user to view details
- Highlighted selection
- Smooth transitions

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### User Details Panel

**Information Displayed**:

- Full user ID
- Email address
- Account creation date
- Last sign-in date
- Authentication provider
- Test generation statistics
- Active sessions count
- Ban status and reason (if applicable)

**Action Buttons**:

1. **Ban User** (Red button)
   - Prompt for ban reason
   - Immediate effect
   - Logged in activity log
   - Prevents user access
2. **Unban User** (Green button)
   - Confirmation required
   - Restores user access
   - Logged in activity log
3. **Reset Password** (Yellow button)

    - Records reset request
    - User notified to use "Forgot Password"
    - Logged in activity log

4. **Delete All User Data** (Dark Red button)

    - Confirmation required
    - Deletes: test history, sessions, ban records
    - Logged in activity log with details
    - **Irreversible action**

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**User Activity Tabs**

**1. Test History Tab**

- Shows all tests generated by user
- User story preview (truncated)
- Framework used
- Test count per generation
- Timestamp
- Scrollable list (max 400px)

**2. Sessions Tab**

- Active user sessions
- Device information
- Last active timestamp
- Session creation date
- Helps identify suspicious activity

**3. Activity Logs Tab** (NEW)

- All admin actions performed on user
- Action types: BAN_USER, UNBAN_USER, PASSWORD_RESET, DELETE_USER_DATA
- Timestamps
- Reason for action (if provided)
- Full audit trail

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## Search & Filter Features

**Search Functionality**:

- Search by email address
- Search by user ID
- Case-insensitive matching
- Real-time results (debounced)
- ILIKE SQL query for partial matches

**Filter Options**:

- **All Users**: Show everyone
- **Active Only**: Exclude banned users
- **Banned Only**: Show only banned users

**Performance**:

- Server-side filtering
- Optimized queries
- Fast response times
- Handles large user bases

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### Activity Logging System

**Logged Actions**:

- User bans (with reason)
- User unbans
- Password resets
- User data deletions

**Log Data Structure**:

- Admin ID (who performed action)
- Action type
- Target user ID
- Timestamp
- Details (JSON): reason, deleted tables, etc.

**Benefits**:

- Complete audit trail
- Compliance and accountability
- Troubleshooting capabilities
- Security monitoring

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# User Account Management

## Account Page Features

**Profile Information**:

- Email address display
- Account creation date
- Last sign-in timestamp
- Authentication provider

**Security Settings**:

- Change password (email users)
- View active sessions
- Sign out from all devices
- Delete account option

**Test History**:

- View all generated tests
- Filter by date/framework
- Export personal data
- Statistics and insights

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# Export & Download Features

## Export Formats

### 1. CSV Export

**Use Case**: Import into test management tools (Jira, TestRail, etc.)

**Structure**:

- Test ID column
- Title column
- Priority column
- Steps column (comma-separated)
- Expected Results column

**Benefits**:

- Spreadsheet compatible
- Easy data manipulation
- Tool integration ready

### 2. Markdown Export

**Use Case**: Documentation and version control

**Structure**:

- Formatted headings
- Numbered steps
- Code blocks for automation
- Clean, readable format

**Benefits**:

- GitHub/GitLab compatible
- Version control friendly
- Human-readable

### 3. ZIP Bundle

**Use Case**: Complete package with all formats

**Contents**:

- manual-tests.md
- automation-tests.md
- tests.csv
- README.md

**Benefits**:

- One-click download
- All formats included
- Project-ready structure

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# Technical Architecture

## Frontend Stack

**Framework**: React 18

- Modern hooks-based architecture
- Functional components
- Context API for state management

**Styling**: TailwindCSS

- Utility-first CSS
- Custom neon theme
- Responsive design
- Dark mode optimized

**Build Tool**: Vite

- Fast development server
- Hot module replacement
- Optimized production builds

**Routing**: React Router v6

- Client-side routing
- Protected routes
- Navigation guards

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## Backend Stack

**Platform**: Netlify Functions (Serverless)

- Automatic scaling
- No server management
- Cost-effective

**API Framework**: Node.js

- Express-like routing
- JSON API responses
- Error handling middleware

**AI Integration**: Google Gemini 1.5 Flash

- Free tier access
- High rate limits
- Advanced language understanding

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## Database

**Provider**: Supabase

- PostgreSQL database
- Real-time capabilities
- Built-in authentication
- Row Level Security (RLS)

**Tables**:

1. **auth.users**: User authentication (managed by Supabase)
2. **user_profiles**: User email and metadata sync
3. **test_history**: All generated tests
4. **user_sessions**: Active session tracking
5. **admin_users**: Super admin role assignments
6. **banned_users**: Banned user records
7. **admin_password_resets**: Password reset tracking
8. **admin_activity_log**: Admin action audit trail

**Security**:

- Row Level Security policies
- Encrypted connections
- Secure API keys
- Role-based access control

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## API Endpoints

### POST /api/generate-tests

**Purpose**: Generate test cases from user story

**Request**:

```json
{
  "story": "As a user, I want to...",
  "framework": "playwright"
}
```

**Response**:

```json
{
  "manualTests": [...],
  "automationSkeletons": "...",
  "framework": "playwright",
  "exports": {
    "markdown": "...",
    "csv": "..."
  }
}
```

### POST /api/save-history

**Purpose**: Save generated tests to user history

**Authentication**: Required

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# Security & Privacy

## Data Protection

**Encryption**:

- All data encrypted in transit (HTTPS)
- Database encryption at rest
- Secure API communication

**Privacy**:

- Users can only access own data
- Admin actions logged
- GDPR-compliant data deletion
- No data sold to third parties

### Access Control

**Authentication Required**:

- Test generation
- Test history access
- Account settings
- Admin dashboard

**Role-Based Access**:

- Regular users: Limited to own data
- Super admins: System-wide access with logging

### Compliance

**Audit Trail**:

- All admin actions logged
- Timestamps recorded
- Action details preserved
- Queryable history

**Data Retention**:

- User controls own data
- Account deletion available
- Test history exportable
- No unnecessary data retention

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## Recent Updates (v1.2.0)

### January 2025 - Enterprise Admin Features

**New Features**:

1. ✅ User search functionality (by email and user ID)
2. ✅ Advanced filters (All/Active/Banned users)
3. ✅ Email display in user lists
4. ✅ Activity logging for all admin actions
5. ✅ Activity Logs tab in user details
6. ✅ Enhanced user statistics (test count, session count)

**Improvements**:

- More professional admin UI

- Better search performance
- Real-time filtering
- Comprehensive audit trail
- Enterprise-level controls

**Technical Changes**:

- Enhanced `getUsersDetailed()` function with filters
- Activity logging infrastructure
- User profiles table with auto-sync trigger
- Optimized database queries

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## Roadmap & Future Enhancements

### Planned Features

**Short Term**:

- Bulk user actions (select multiple users)
- CSV export of user data
- Advanced analytics dashboard
- Email notifications for admin actions

**Medium Term**:

- Cypress framework support
- Selenium WebDriver support
- Custom test templates
- Team collaboration features
- API key management for users

**Long Term**:

- Integration with CI/CD pipelines
- Test execution tracking
- Test case versioning
- Multi-language support
- White-label options

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## Support & Contact

**Documentation**: See README.md for setup instructions

**Issues**: Report bugs via GitHub Issues

**Feature Requests**: Submit via GitHub Discussions

**Security Issues**: Contact maintainer directly

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## Changelog

### v1.2.0 (January 2025)

- Added enterprise admin features

- User search and filtering
- Activity logging system
- Enhanced user management UI

### v1.1.0 (December 2024)

- Super admin dashboard
- User ban/unban functionality
- Password reset management
- Session tracking

### v1.0.0 (November 2024)

- Initial release
- AI-powered test generation
- Multi-framework support
- Authentication system
- Export functionality

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**Document End**

*This document is automatically maintained and updated with each feature release.*