UT DALLAS
The University of Texas at Dallas

SmartData
SOLUTIONS

CS 4485, Fall 2025
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QuickClaim 2.0

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Abstract

Quick Claim 2.0 is an AI-powered upgrade of Smart Data Solutions' current claims management platform. The project aims to make claims processing faster and easier by adding strong analytics tools and smarter ways to work with documents. It will let users ask questions in plain language, get useful insights, and see trends through simple visualizations. With features like dynamic document search, built-in Q&A, and dashboards, the system cuts down on manual work and improves daily operations. By turning slow, manual processes into interactive and data-driven ones using AI, Quick Claim 2.0 improves speed, visibility, and user experience. This, in turn, helps claims get resolved faster and clients receive better service.

Keywords: QuickClaim 2.0; medical claims analytics; document interaction; interactive dashboard; natural language to SQL; AI-assisted querying; MySQL; synthetic claims data; customizable widgets; Smart Data Solutions (SDS)

Architecture

Front-End
The front-end is built in Next.js/React with shadcn/ui and SDS's purple/coral branding, delivering a modern, responsive dashboard with stat cards, queues, recent-claims tables, and a natural-language QueryInput. Glassmorphism, high-contrast badges, and decorative patterns support readable, customizable analytics and document views.

Authentication & Sessions
NextAuth v5 with server actions provides secure login/logout, JWT-based sessions, and a protected dashboard. The login page is fully integrated with the backend via useFormState, so only authenticated users can access claims data and analytics.

LLM Query Engine
A natural-language-to-SQL engine uses a locally hosted LLM (SmolLM3 via LM Studio) to turn user questions into validated, SELECT-only SQL. A SQL validation layer enforces read-only access, blocks injection, handles BigInt fields, and offers a toggle between "thinking mode" and fast /no_think queries.

Data & Database
A MySQL database seeded with synthetic claims data backs all analytics, reflecting CMS-1500-style fields and KPIs defined in earlier design work. Results are returned as table views to support filtering, queue triage, and task monitoring.

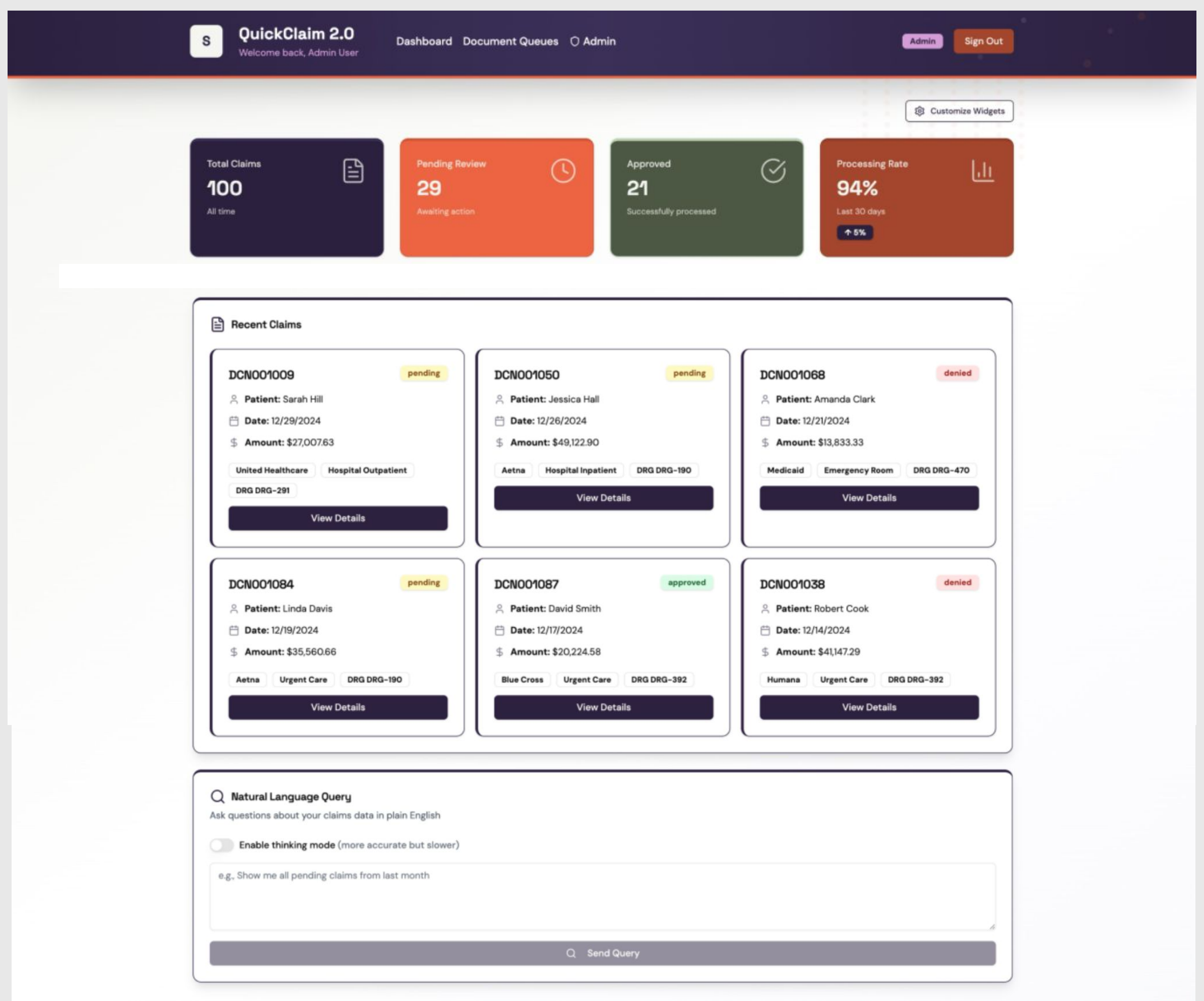
SDS Environment & Integration
QuickClaim 2.0 is developed entirely on SDS AWS workstations and is designed to align with SDS's Java/MySQL, Velocity, and Preact stack. The prototype can be adapted to SDS-approved LLMs and integrated into existing workflows while respecting security and tooling constraints.

Features

- **AI-Powered Natural Language Search**. Ask questions like "show pending claims over $500 from the last 30 days" and get validated, read-only SQL results without writing queries.
- **Interactive Claims Analytics**. SDS-branded dashboard with stat cards, trend-style metrics, and recent-claims tables for fast insight into workload and risk.
- **Document & Queue Views**. Support for queue-style workflows (e.g., reject/manual/eligibility/provider matching) and task lists with age/overdue highlighting to focus attention.
- **Customizable Dashboard Widgets**. Planned widget library and personalization layer so users can add/remove cards, rearrange layouts, and tweak themes per client or role.
- **Secure Authentication**. NextAuth v5 with protected routes, session handling, and a fully integrated login flow to keep claims data access-controlled.
- **SDS-Themed UI**. Purple/coral color scheme, glassmorphism, and modern interactions aligned with SDS brand standards for a production-realistic look and feel.

Impact

QuickClaim 2.0 adds AI-assisted analytics and document interaction to claims review, replacing static, one-size-fits-all reports with an interactive, configurable dashboard that allows analysts to ask natural-language questions, instantly surface high-risk or overdue queues, and drill into claims. Customizable widgets and layouts let teams adapt the interface to different SDS clients, workflows, and roles, improving both visibility and decision speed. Together, these capabilities lay the groundwork for a more proactive, data-driven operations model at SDS.



Total Claims 100 All time
Pending Review 29 Awaiting action
Approved 21 Successfully processed
Processing Rate 94% Last 30 days ↑ 5%

Recent Claims

DCN001009 pending
Patient: Sarah Hill
Date: 12/29/2024
Amount: $27,007.63
United Healthcare · Hospital Outpatient · DRG DRG-291

DCN001050 pending
Patient: Jessica Hall
Date: 12/26/2024
Amount: $49,122.90
Aetna · Hospital Inpatient · DRG DRG-190

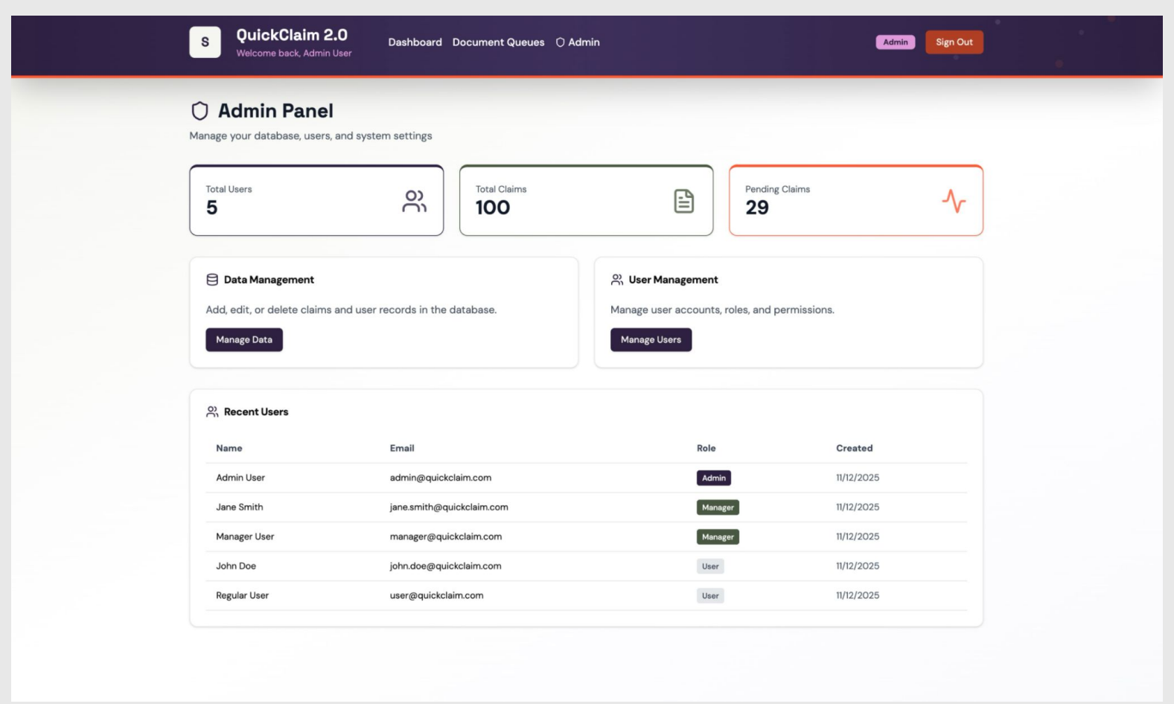
DCN001068 denied
Patient: Amanda Clark
Date: 12/21/2024
Amount: $13,833.33
Medicaid · Emergency Room · DRG DRG-470

DCN001084 pending
Patient: Linda Davis
Date: 12/19/2024
Amount: $35,560.66
Aetna · Urgent Care · DRG DRG-190

DCN001087 approved
Patient: David Smith
Date: 12/17/2024
Amount: $20,224.58
Blue Cross · Urgent Care · DRG DRG-392

DCN001038 denied
Patient: Robert Cook
Date: 12/14/2024
Amount: $41,147.29
Humana · Urgent Care · DRG DRG-392

Natural Language Query
Ask questions about your claims data in plain English
Enable thinking mode (more accurate but slower)
e.g., Show me all pending claims from last month



Admin Panel
Manage your database, users, and system settings

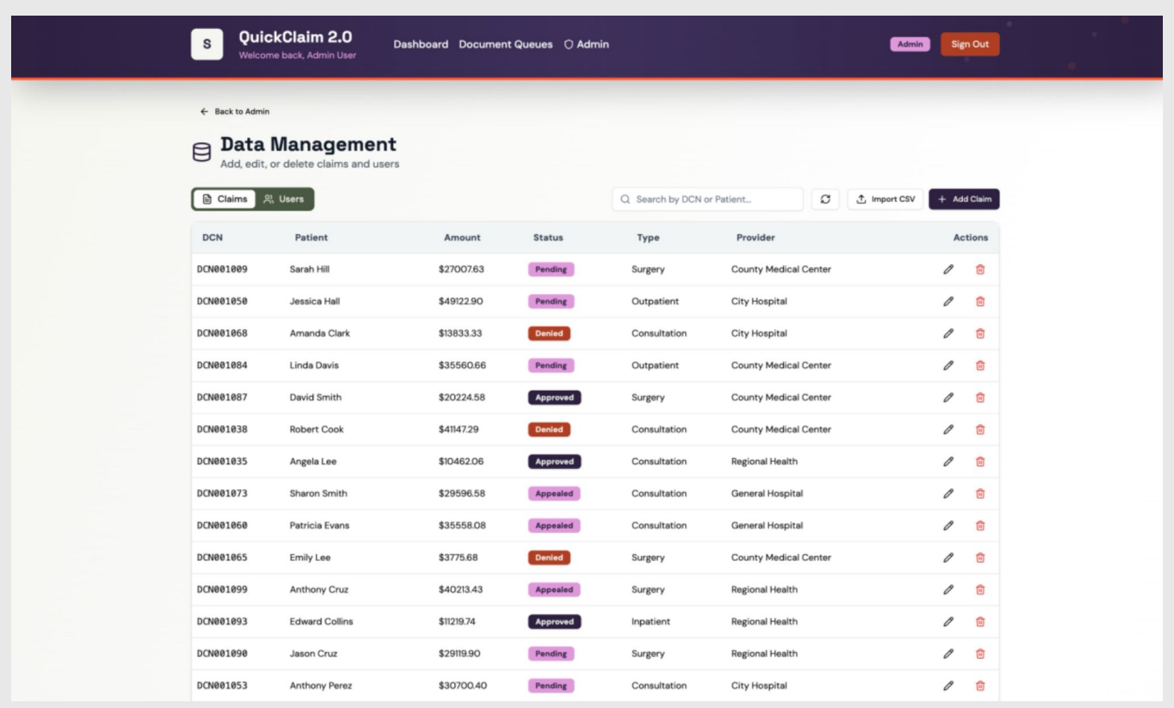
Total Users 5
Total Claims 100
Pending Claims 29

Data Management
Add, edit, or delete claims and user records in the database.

User Management
Manage user accounts, roles, and permissions.

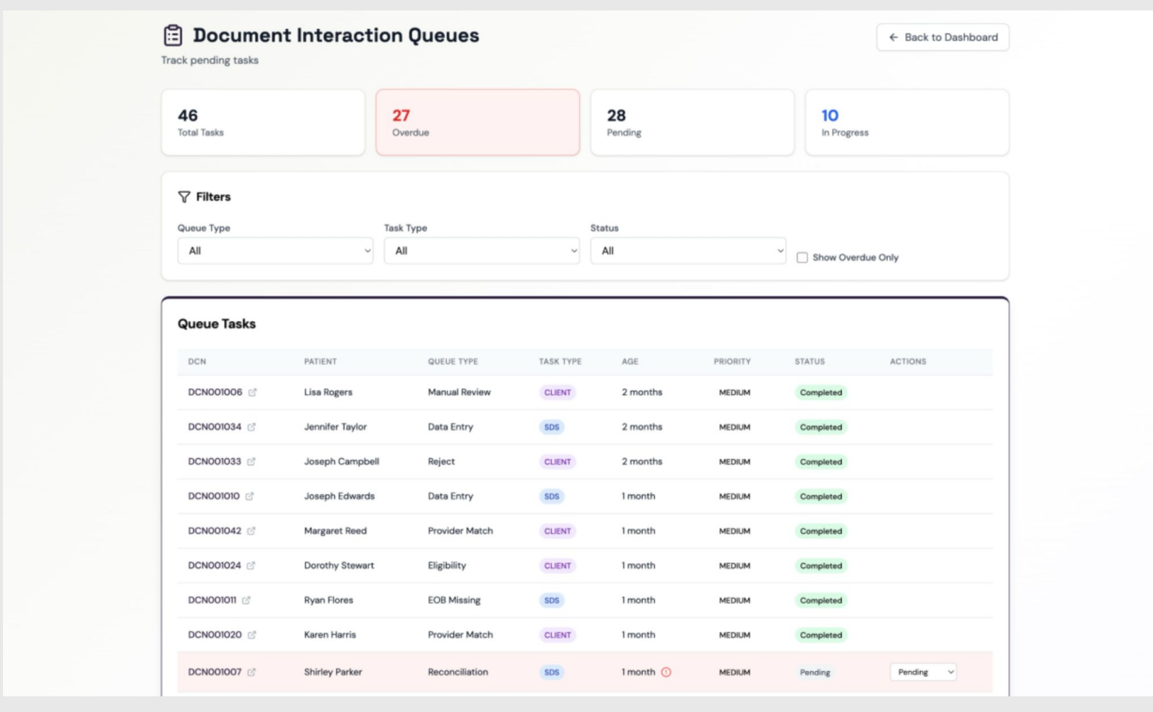
Recent Users

Name	Email	Role	Created
Admin User	admin@quickclaim.com	Admin	11/12/2025
Jane Smith	jane.smith@quickclaim.com	Manager	11/12/2025
Manager User	manager@quickclaim.com	Manager	11/12/2025
John Doe	john.doe@quickclaim.com	User	11/12/2025
Regular User	user@quickclaim.com	User	11/12/2025



Data Management
Add, edit, or delete claims and users

DCN	Patient	Amount	Status	Type	Provider	Actions
DCN001009	Sarah Hill	$27007.63	Pending	Surgery	County Medical Center	
DCN001050	Jessica Hall	$49122.90	Pending	Outpatient	City Hospital	
DCN001068	Amanda Clark	$13833.33	Denied	Consultation	City Hospital	
DCN001084	Linda Davis	$35560.66	Pending	Outpatient	County Medical Center	
DCN001087	David Smith	$20224.58	Approved	Surgery	County Medical Center	
DCN001038	Robert Cook	$41147.29	Denied	Consultation	County Medical Center	
DCN001035	Angela Lee	$10462.06	Approved	Consultation	Regional Health	
DCN001073	Sharon Smith	$29596.58	Appealed	Consultation	General Hospital	
DCN001060	Patricia Evans	$35558.08	Appealed	Consultation	General Hospital	
DCN001065	Emily Lee	$3775.68	Denied	Surgery	County Medical Center	
DCN001099	Anthony Cruz	$40213.43	Appealed	Surgery	Regional Health	
DCN001093	Edward Collins	$11219.74	Approved	Inpatient	Regional Health	
DCN001090	Jason Cruz	$29119.90	Pending	Surgery	Regional Health	
DCN001053	Anthony Perez	$30700.40	Pending	Consultation	City Hospital	



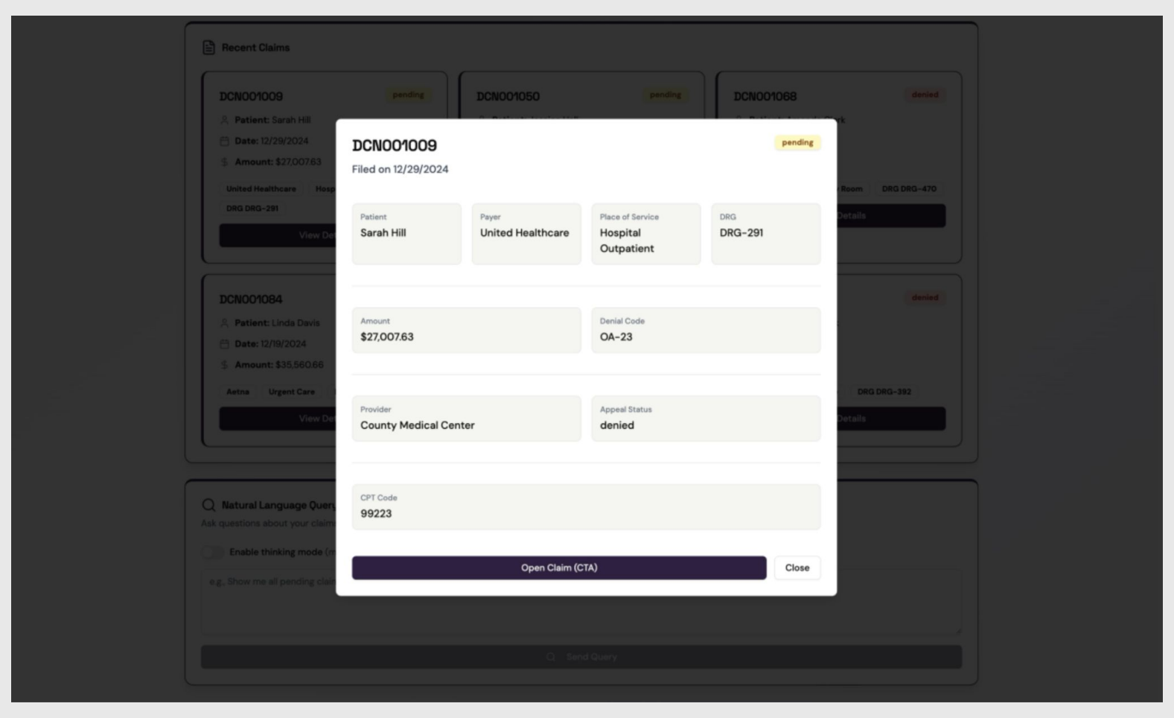
Document Interaction Queues
Track pending tasks

46 Total Tasks
27 Overdue
28 Pending
10 In Progress

Queue Type: All
Task Type: All
Status: All

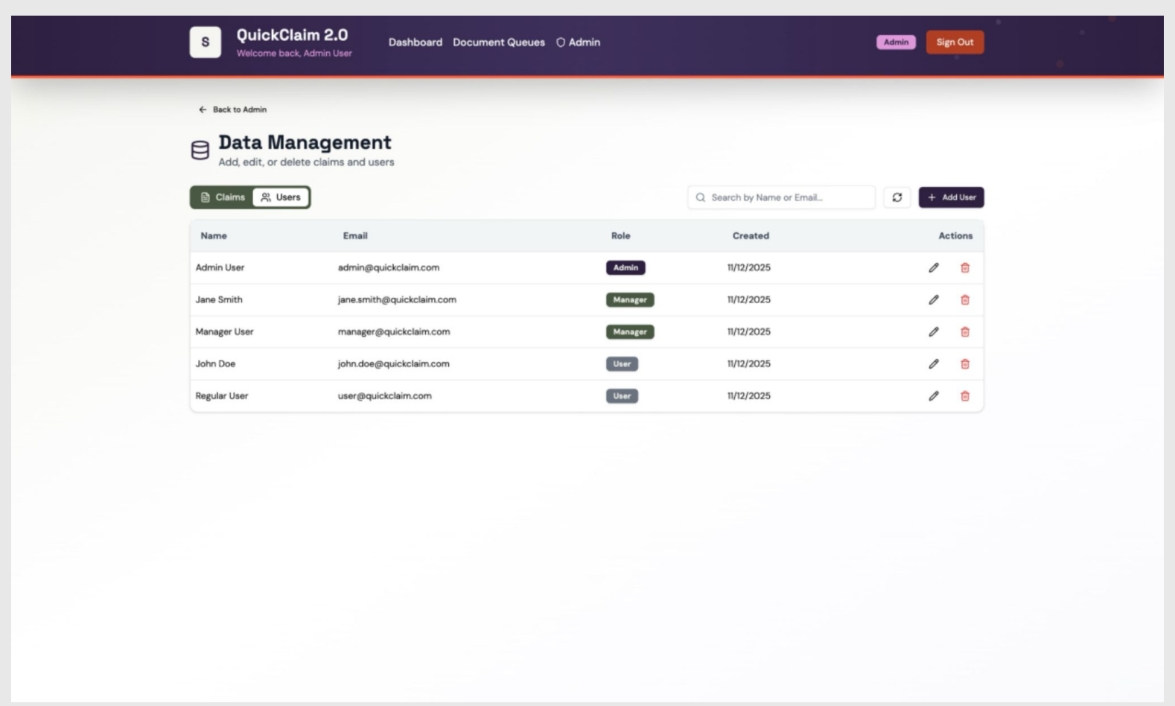
Queue Tasks

DCN	PATIENT	QUEUE TYPE	TASK TYPE	AGE	PRIORITY	STATUS	ACTIONS
DCN001006	Lisa Rogers	Manual Review	CLIENT	2 months	MEDIUM	Completed	
DCN001034	Jennifer Taylor	Data Entry	SDS	2 months	MEDIUM	Completed	
DCN001033	Joseph Campbell	Reject	CLIENT	2 months	MEDIUM	Completed	
DCN001010	Joseph Edwards	Data Entry	SDS	1 month	MEDIUM	Completed	
DCN001042	Margaret Reed	Provider Match	CLIENT	1 month	MEDIUM	Completed	
DCN001024	Dorothy Stewart	Eligibility	CLIENT	1 month	MEDIUM	Completed	
DCN001011	Ryan Flores	EOB Missing	SDS	1 month	MEDIUM	Completed	
DCN001020	Karen Harris	Provider Match	CLIENT	1 month	MEDIUM	Completed	
DCN001007	Shirley Parker	Reconciliation	SDS	1 month	MEDIUM	Pending	Pending



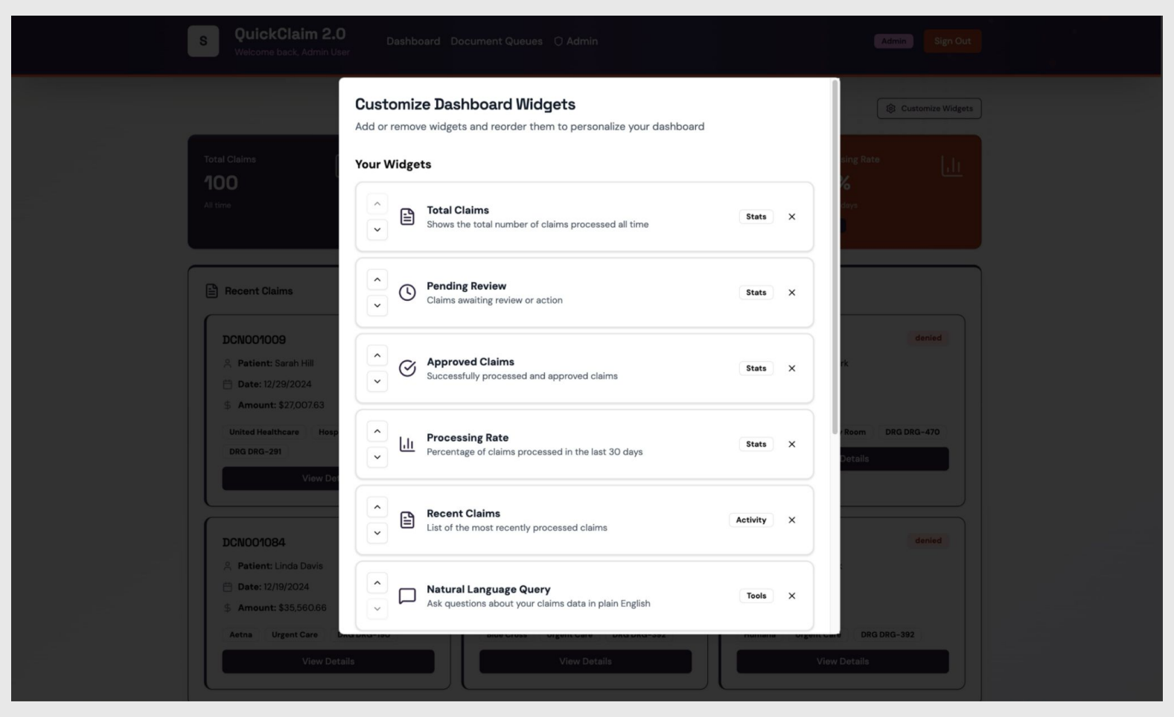
DCN001009 pending
Filed on 12/29/2024

Patient: Sarah Hill
Payer: United Healthcare
Place of Service: Hospital Outpatient
DRG: DRG-291
Amount: $27,007.63
Denial Code: OA-23
Provider: County Medical Center
Appeal Status: denied
CPT Code: 99223



Data Management
Add, edit, or delete claims and users

Name	Email	Role	Created	Actions
Admin User	admin@quickclaim.com	Admin	11/12/2025	
Jane Smith	jane.smith@quickclaim.com	Manager	11/12/2025	
Manager User	manager@quickclaim.com	Manager	11/12/2025	
John Doe	john.doe@quickclaim.com	User	11/12/2025	
Regular User	user@quickclaim.com	User	11/12/2025	



Customize Dashboard Widgets
Add or remove widgets and reorder them to personalize your dashboard

Your Widgets

- Total Claims: Shows the total number of claims processed all time (Stats)
- Pending Review: Claims awaiting review or action (Stats)
- Approved Claims: Successfully processed and approved claims (Stats)
- Processing Rate: Percentage of claims processed in the last 30 days (Stats)
- Recent Claims: List of the most recently processed claims (Activity)
- Natural Language Query: Ask questions about your claims data in plain English (Tools)

Future Work

Looking ahead, a key priority is building a full document viewer and task pane so users can open claim artifacts, see which queues they belong to, and act on overdue items in one place, with clear separation between client actions and SDS actions. The planned widget library and personalization layer will be implemented so each user or client can choose their metrics, rearrange cards, switch themes, and have the dashboard remember their layout across logins. On the AI side, the current SmolLM3-based engine will be swapped or augmented with SDS-approved LLMs (such as LLaMA or SDS's internal models) so all inference stays inside SDS infrastructure while retaining natural-language-to-SQL and explanation capabilities. The queues page will be expanded into deeper analytics.