Pact: Full System Specification

Smart Signing, Pricing Activation & Document Orchestration Platform

1.0 System Overview

1.1 Project Name

Pact: Smart Signing, Pricing Activation & Document Orchestration Platform

1.2 Description

Pact is an enterprise-grade smart contract, document, and pricing activation platform built for GPOs, suppliers, and members. It orchestrates the entire lifecycle of high-stakes business agreements, from template creation and field mapping to multi-party signing and complex, duplex price activation workflows.
The platform is designed as a service-oriented architecture, centered around a main gateway application that consumes a suite of specialized microservices. It supports:

- **Electronic & Manual Signing:** Integrates with e-signature platforms (AssureSign v3.7) and handles manual (scanned) returns via OCR and barcode matching.
- **Deep Data Integration:** Maps document fields to internal/external data sources and qualification logic.
- **Price Activation Workflows:** Manages a complex, asynchronous, duplex "conversation" with external pricing systems, including proposals, feedback, appeals, and retries.
- **Enterprise Data Management:** Handles distributor chain validation, ETL of incoming purchase feeds (for volume/tier validation), and exclusivity enforcement.
- **Full Lifecycle Management:** Tracks contracts from start/end dates, manages rollovers, and monitors coverage zones.

This document represents the complete, phased specification for the entire platform.

2.0 System Architecture

2.1 Service-Oriented Architecture (SOA)

The Pact platform is not a single monolith. It is a collection of discrete services that communicate via APIs, all orchestrated by a central gateway application.

- **Gateway Application (...-gtwy-main):** The user-facing web application (sitemap detailed below). This is the "cockpit" where all other services are consumed.
- **Core Services:** Handle storage, authentication, and core logic.
- **Specialized Services:** Handle discrete business functions (e.g., e-signing, manual returns, activation).

2.2 Component Breakdown

Service ID	Service Name	Purpose
Gateway		
uberpu-ntiva/dox-gtwy-main	Gateway Application	The main user-facing HTML/JS application. Renders all UIs.
Core Services		
uberpu-ntiva/dox-core-store	Central Store Service	Manages data persistence. Uses **SharePoint Online (via Graph API)** for file/document storage and **MSSQL** for metadata, transactions, and relational data.
uberpu-ntiva/dox-core-auth	Auth Service	Handles user authentication, role-based access (RBAC), and site-switching context via **Azure B2C**.
uberpu-ntiva/dox-core-rec-engine	Recommendation Engine	(Phase 2) Analyzes aggregated data to suggest bundles, tier raises, etc.
Document & Template Services		
uberpu-ntiva/dox-tmpl-service	Template Service	Core logic for managing templates, field definitions (page, coordinates, type), data mappings, and "recipes" (bundles).
uberpu-ntiva/dox-tmpl-pdf-upload	PDF Upload Service	Ingests new PDF documents. Called by ...-gtwy-main.
uberpu-ntiva/dox-tmpl-field-mapper	Field Mapper Service	Analyzes PDFs to auto-detect AcroForms or suggest fields based on text anchors (contextual placement).
Signing & Transaction Services		
uberpu-ntiva/dox-esig-service	E-Signature Service	Manages integration with **Nintex-AssureSign (v3.7)**. Creates templates, starts signing transactions, maps signers.
uberpu-ntiva/dox-esig-webhook-listener	E-Sig Webhook Listener	Public-facing endpoint to receive status updates (e.g., "signed," "viewed") from AssureSign.
uberpu-ntiva/dox-rtns-manual-u	Manual Return Upload	(Inherited) UI/API for uploading

Service ID	Service Name	Purpose
pload		scanned, physically signed documents.
uberpu-ntiva/dox-rtns-barcode-matcher	Barcode/OCR Matcher	Scans manual uploads for barcodes to link to transactions. Runs OCR to extract field data for validation.
Price Activation Services		
uberpu-ntiva/dox-actv-service	Activation Service	The core duplex workflow engine. Submits proposals, manages statuses (Pending, Submitted, Rejected, Appealed), and handles retry/appeal logic based on external feedback.
uberpu-ntiva/dox-actv-listener	Activation Listener	Public-facing endpoint to receive asynchronous replies from external pricing systems.
Data & Enterprise Services		
uberpu-ntiva/dox-data-etl-service	ETL Service	Manages incoming purchase data feeds (CSV, API, SharePoint). Validates volume commitments and tier eligibility.
uberpu-ntiva/dox-data-distrib-service	Distributor Service	Manages parent/child distributor relationships, types, and validity periods for activation checks.
uberpu-ntiva/dox-data-aggregation-service	Aggregation Service	Combines data from all services for holistic reporting (coverage, commitments, tiers).
Automation & Lifecycle Services		
uberpu-ntiva/dox-auto-workflow-engine	Workflow Engine	Admin-configurable automation (Trigger -> Condition -> Action). E.g., "On: Signing Complete" -> "Action: Submit to Activation."
uberpu-ntiva/dox-auto-lifecycle-service	Lifecycle Service	Manages contract start/end dates, triggers rollovers, and tracks coverage zones (Pending, Active).

2.3 Technology Stack

Layer	Recommended Tech	Notes
Frontend	Vanilla JavaScript, HTML5, CSS (Astro optional)	...-gtwy-main will be a fast, server-light application.
Backend	Python (FastAPI, Flask) or	Microservices will be built using

Layer	Recommended Tech	Notes
	Node.js	this stack.
Database	**MSSQL** w/ JSON, FTS, File Tables & Vector	...-core-store metadata layer.
File Storage	**SharePoint Online (via Graph API)**	...-core-store file layer. Stores originals, signed copies, evidentiary materials.
OCR	Tesseract / omOCR	Used by ...-rtns-barcode-matcher.
Auth	**Azure B2C** (JWT + OAuth2)	Handled by ...-core-auth.
Hosting	Azure, AWS	Containerized (Docker).
DevOps	Docker + GitHub Actions	
E-Signature	**Nintex-AssureSign (v3.7 API)**	Handled by ...-esig-service. *DocuSign planned as future alternate.*

3.0 Gateway Application (...-gtwy-main) Specification

This is the primary user interface. It is a "shell" application that makes API calls to all other services.

3.1 Gateway Sitemap & Page Specification

- /login (**Login Page**):
  - Authenticates against ...-core-auth (Azure B2C).
- / (**Dashboard**):
  - Role-based summary.
  - Widgets for "Active Workflows" (from ...-esig-service), "Pending Activations" (from ...-actv-service), and "Manual Returns to Validate" (from ...-rtns-barcode-matcher).
- /documents (**Document Manager**):
  - Lists all templates from ...-tmpl-service.
  - Shows metadata: Fields Mapped, Bundles, Status.
  - Action: "Upload New Template" (calls ...-tmpl-pdf-upload).
  - Action: "Map Fields" (links to /documents/:id/map).
- /documents/:id/map (**Field Mapper UI**):
  - **Crucial Screen.**
  - **Left Panel:** PDF preview.
  - **Middle Panel:** List of fields (from ...-tmpl-field-mapper).
  - **Right Panel:** Properties for selected field (Name, Type, Signer, **Data Mapping**).
  - Data Mapping allows linking a field to a signer (Signer 1: Full Name) or a data query (get_member_id).
- /documents/:id/settings (**Document Settings**):
  - Manages non-field metadata.
  - **Lifecycle:** Contract Start/End Date, Rollover Policy.
  - **Enterprise:** Exclusivity Flag, Applicable Sites, Committed Volume.
- /bundles (**Bundle Manager**):
  - Lists "recipes" (groups of templates) from ...-tmpl-service.
  - Action: "Edit Bundle" (links to /bundles/:id/edit).

    - Action: "Batch Send" (links to /bundles/:id/send).
- /bundles/:id/edit (**Bundle Builder UI**):
    - Drag-and-drop UI to order templates and define signer roles.
- /bundles/:id/send (**Batch Send UI**):
    - "Mail merge" interface. Upload CSV or select targets from ...-gtwy-signer-manager-ui.
    - Triggers ...-esig-service to create multiple transactions.
- /signers (**Signer Manager**):
    - Simple CRM for known signers and their "Associated Businesses."
- /transactions (**Transactions Dashboard**):
    - Unified "Control Tower" for all signing.
    - Lists *both* e-sign transactions (from ...-esig-webhook-listener) and manual returns (from ...-rtns-barcode-matcher).
- /transactions/:tx_id (**Transaction Detail**):
    - Shows full audit log for one transaction.
    - "Download Signed PDF" (pulls from ...-core-store/SharePoint).
- /returns/upload (**Manual Return Upload UI**):
    - (Inherited) Frontend for ...-rtns-manual-upload.
    - On upload, calls ...-rtns-barcode-matcher to identify.
- /returns/validate/:return_id (**OCR Validation UI**):
    - Human-in-the-loop validation.
    - **Left Panel:** Scanned document image.
    - **Right Panel:** Expected fields from the template. User types in values from the image to confirm OCR.
- /activations (**Activations Dashboard**):
    - Kanban or Table view of all price activation proposals from ...-actv-service.
    - Statuses: Pending Submission, Submitted (Awaiting Reply), Rejected, Approved.
- /activations/new (**Activation Builder UI**):
    - Wizard to create a new proposal.
    - Step 1: Link completed, signed documents (from ...-core-store).
    - Step 2: Upload supporting proof (Burden of Proof docs).
    - Step 3: Submit to ...-actv-service.
- /activations/:act_id (**Activation Detail View**):
    - **Crucial Screen.** Manages the duplex conversation.
    - Shows a "conversation log" with the external system.
    - *Example:*
        - [PACT] 10:01 AM: Proposal Submitted.
        - [EXTERNAL] 10:05 AM: Received. (ID: ext-8a4b2).
        - [EXTERNAL] 10:30 AM: REJECTED. Reason: "Volume commitment data missing."
    - **Actions:** Based on status, shows "Appeal" or "Adjust Offer & Retry" buttons.
- /admin/data-feeds (**Data Feeds UI**):
    - Admin frontend for ...-data-etl-service.
    - Shows ETL job status, logs, and "Run Now" button.
- /admin/distributors (**Distributor Management UI**):
    - Admin frontend for ...-data-distrib-service.
    - Visual tree/org chart editor for parent/child relationships.
- /admin/workflows (**Workflow Builder UI**):

    - Admin frontend for ...-auto-workflow-engine.
    - Visual "Trigger -> Condition -> Action" builder.
- /admin/settings (**Admin Settings**):
    - Global configuration: Pricing Tiers, Chargeback Codes, User Permissions.
- /admin/reporting (**Reporting Dashboard**):
    - BI dashboard consuming data from ...-data-aggregation-service.

4.0 Detailed Database Schema (...-core-store: MSSQL Layer)

This schema combines all entities from the PDF into a unified model.

Table	Fields	Description
Core		
users	id (PK), name, email, site_id (FK), role, b2c_object_id	Manages users and their primary site.
sites	id (PK), name, status	Manages the different tenant sites.
Documents		
documents	id (PK), site_id (FK), name, original_file_key (SharePoint), template_status (Draft, Active), external_template_id (AssureSign), barcode_id	Master document templates.
document_site_applicability	document_id (FK), site_id (FK)	Junction table for multi-site documents.
fields	id (PK), document_id (FK), field_name, field_type (Text, Sig, Date), page_number, coordinates (JSON), mapped_data_source (query), required	Defines fillable fields on a document.
local_mapping_overrides	id (PK), field_id (FK), site_id (FK), overridden_mapped_data	Site-specific mapping overrides.
Bundles		
bundles	id (PK), site_id (FK), name (e.g., "Recipe Name")	A reusable "recipe" of documents.
bundle_templates	id (PK), bundle_id (FK), document_id (FK), sort_order	Junction table for documents in a bundle.
Signers		
signers	id (PK), site_id (FK), name, email, associated_business	The CRM of known signers.
Transactions		
transactions	id (PK), bundle_id (FK), status (Pending, Sent, Completed, Failed), type (ESign, Manual), external_tx_id (AssureSign)	A single "signing session."
transaction_targets	id (PK), transaction_id (FK),	Tracks each signer in a

Table	Fields	Description
	signer_id (FK), status (Pending, Viewed, Signed)	transaction.
transaction_logs	id (PK), transaction_id (FK), event_type, field_data_snapshot (JSON), timestamp	Full audit trail. Captures pre-sign and post-sign field values.
manual_returns	id (PK), transaction_id (FK - nullable), barcode_id, scanned_file_key (SharePoint), ocr_data (JSON), status (Pending Validation, Validated)	Tracks uploaded manual returns.
Activations		
activations	id (PK), member_id, proposal_data (JSON), status (Pending, Submitted, Rejected, Approved, Appealed), external_submission_id, external_feedback (JSON)	The core price activation proposals.
activation_transactions	activation_id (FK), transaction_id (FK)	Links signed documents to an activation.
activation_proof_docs	id (PK), activation_id (FK), file_key (SharePoint), description	"Burden of Proof" documents.
activation_logs	id (PK), activation_id (FK), request_payload, response_payload, status_change, timestamp	Logs the duplex conversation.
Enterprise Data		
distributors	id (PK), name, external_id, site_id, type	Manages distributor entities.
distributor_relationships	id (PK), parent_distributor_id (FK), child_distributor_id (FK), relationship_type, effective_date, expiration_date	The parent/child chain.
etl_jobs	id (PK), name, source_type (API, CSV), last_run, status, error_log	Tracks ETL jobs from ...-data-etl-service.
purchase_data	id (PK), member_id, supplier_id, amount, date, volume	Stores purchase data from ETL jobs.
contracts	id (PK), document_id (FK), start_date, end_date, exclusivity_flag, committed_volume, renewal_policy,	Manages the contract lifecycle.

Table	Fields	Description
	coverage_zone_status	
Automation		
workflows	id (PK), site_id (FK), name, trigger_event, conditions (JSON), actions (JSON)	Stores configured automations.

5.0 Core API Specification (REST)

This defines the communication between the gateway and the microservices.

5.1 Document & Template APIs

- **POST /api/documents** (-> ...-tmpl-pdf-upload)
  - Uploads a new PDF.
  - Returns: { "document_id": "...", "status": "processing" }
- **GET /api/documents** (-> ...-tmpl-service)
  - Lists all templates for the site.
- **GET /api/documents/:id/fields** (-> ...-tmpl-field-mapper)
  - Gets all detected/mapped fields for a document.
- **POST /api/documents/:id/fields** (-> ...-tmpl-service)
  - Saves the complete field mapping (coordinates, types, data links).

5.2 Bundle & Transaction APIs

- **POST /api/bundles** (-> ...-tmpl-service)
  - Creates a new "recipe" (bundle).
- **POST /api/bundles/:id/batch-send** (-> ...-esig-service)
  - Body: [{ "email": "...", "role": "Signer 1" }, ...]
  - Kicks off a new batch transaction.
- **GET /api/transactions** (-> ...-core-store)
  - Lists all transactions (e-sign and manual).
- **POST /api/hooks/status** (-> ...-esig-webhook-listener)
  - **External:** AssureSign sends status updates here.

5.3 Manual Return APIs

- **POST /api/return/upload** (-> ...-rtns-manual-upload)
  - Uploads a scanned PDF.
  - Triggers ...-rtns-barcode-matcher.
  - Returns: { "return_id": "...", "status": "Pending Validation", "matched_tx_id": "..." }
- **POST /api/return/validate/:id** (-> ...-rtns-barcode-matcher)
  - Body: { "field_name": "value", ... }
  - Submits the human-validated OCR data.

5.4 Price Activation APIs (Duplex)

- **POST /api/activations/submit** (-> ...-actv-service)

    - Body: { "proposal_data": {...}, "linked_tx_ids": [...], "proof_doc_keys": [...] }
    - Submits a new proposal. The service then calls the external system.
- **GET /api/activations/status/:id** (-> ...-actv-service)
    - Gets the current status and conversation log.
- **POST /api/activations/appeal/:id** (-> ...-actv-service)
    - Submits an appeal after rejection.
- **PATCH /api/activations/adjust-offer/:id** (-> ...-actv-service)
    - Adjusts the proposal based on feedback and retries.
- **POST /api/hooks/activation-reply** (-> ...-actv-listener)
    - **External:** The external pricing system sends its async reply here.

5.5 Enterprise Data APIs

- **GET /api/distributors/tree** (-> ...-data-distrib-service)
    - Fetches the visual relationship map.
- **POST /api/etl/run/:job_id** (-> ...-data-etl-service)
    - Manually triggers an ETL job.

6.0 Compliance & Security

- **Authentication:** All API endpoints must be secured via **Azure B2C (JWT)**, managed by ...-core-auth.
- **Authorization:** Role-Based Access Control (RBAC) must be enforced at the API gateway.
- **Compliance:**
    - **ESIGN/UETA:** Handled by AssureSign integration and storage of evidentiary materials.
    - **GDPR/HIPAA:** All PII in the database (e.g., signers table) must be encrypted at rest.
- **Audit Trails:** transaction_logs and activation_logs provide an immutable history of all actions, field values (pre/post), and decisions.