EIS-to-Dynamics 365

Pet Insurance POC Technical Documentation

Version: 1.0

Date: December 2024

Classification: Internal

AI-Powered Pet Insurance Integration Platform

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1. Executive Summary

Project Overview

The EIS-to-Dynamics 365 Pet Insurance Proof of Concept demonstrates the integration between EIS Insurance Suite and Microsoft Dynamics 365, showcasing AI-powered pet claims processing, vet invoice OCR, breed-based rating, and a modern agent portal. This solution enables pet insurance carriers to leverage both platforms while providing a seamless experience for agents and pet owners.

> **Key Objective**
>
> Validate the technical feasibility of integrating EIS Suite pet insurance functionality with Dynamics 365 CRM capabilities through a hybrid architecture approach, featuring AI-powered claim extraction and breed-specific rating.

Workstream Summary

Workstream	Description	Technology	Status
WS1	Foundation & Infrastructure	Terraform, Azure	Complete
WS2	AI Pet Claims Service	FastAPI, Azure OpenAI	Complete
WS3	EIS Integration Layer	FastAPI, Service Bus	Complete
WS4	Agent Portal	Next.js, React	Complete
WS5	Pet Rating Engine	FastAPI, Python	Complete
WS6	Validation & Testing	Pytest, Locust	Complete

Technology Stack

FE **Frontend**

Next.js 14, React 18, Tailwind CSS, React Query

BE **Backend**

Python 3.11, FastAPI, Pydantic, HTTPX

AI **AI Services**

Azure OpenAI (GPT-4o), Claude API, Document Intelligence (Vet Invoice OCR)

DB **Data Layer**

Cosmos DB (Breed Database), Dataverse, Azure Blob Storage

Key Performance Metrics

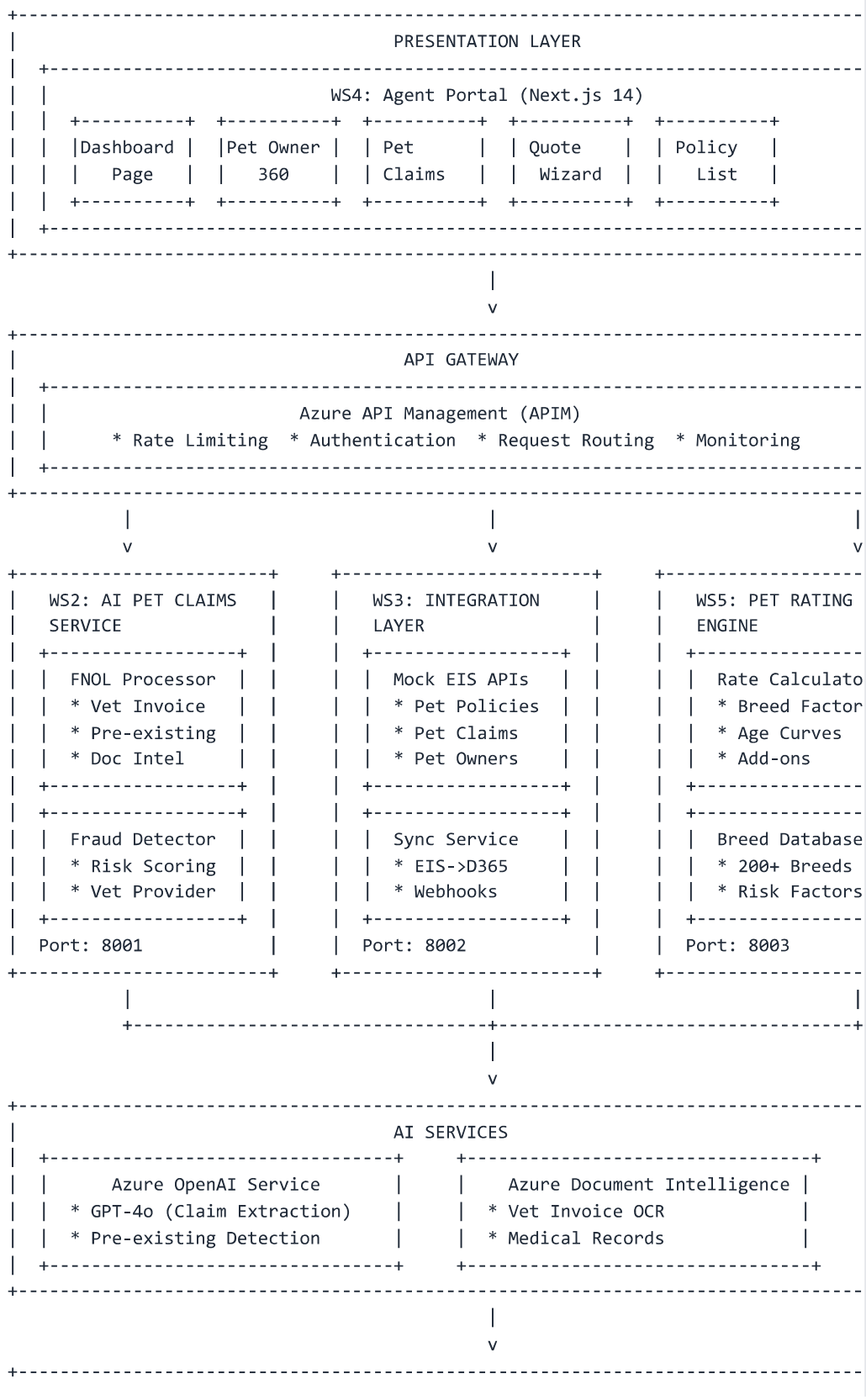
<500ms	94%	+/-2%	<1%
API Latency (P95)	Vet Invoice OCR Accuracy	Rating Parity vs EIS	Error Rate

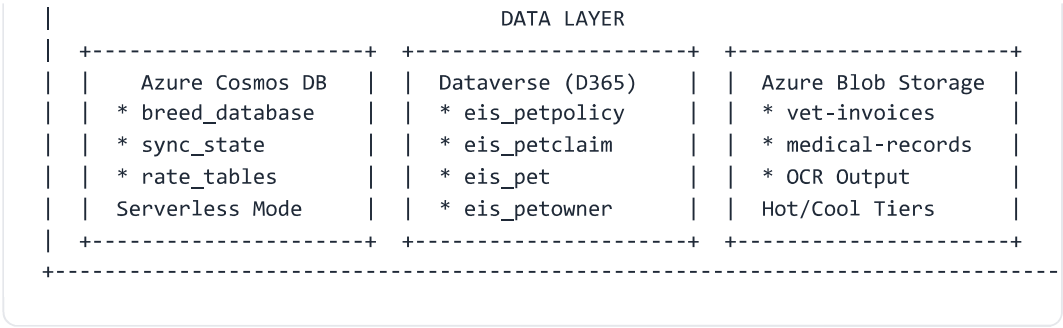
2. System Architecture

Architecture Overview

The pet insurance solution follows a microservices architecture pattern with clear separation of concerns. Each workstream is implemented as an independent service, communicating through well-defined APIs and event-driven messaging. The architecture supports breed-specific rating, vet invoice processing, and pre-existing condition detection.

High-Level System Architecture - Pet Insurance





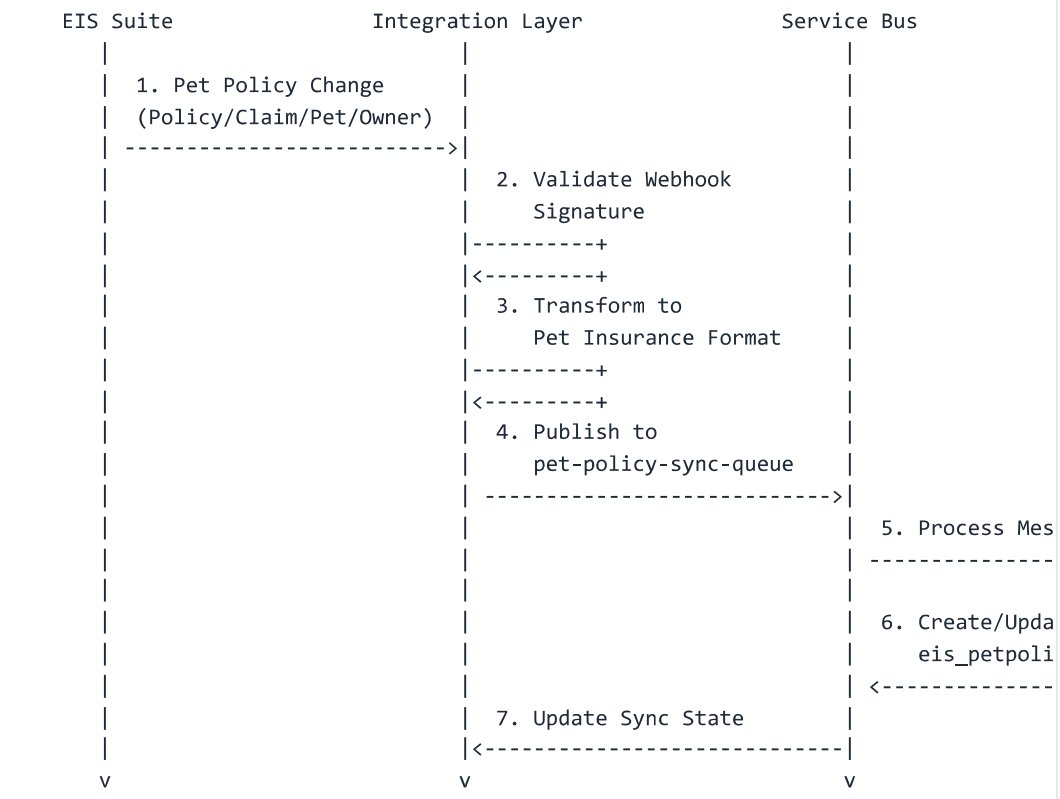
Infrastructure Components

Resource	Name Pattern	Purpose	Est. Cost/mo
Resource Groups	`rg-eis-pet-d365-{layer}-dev`	Organize by: shared, data, ai, integration	-
Key Vault	`kv-eispetd365-dev`	Secrets management	$3
Storage Account	`steispetd365dev`	Blob storage for vet invoices	$5
Service Bus	`sb-eispetd365-dev`	Event messaging (queues/topics)	$10
Cosmos DB	`cosmos-eispetd365-dev`	Breed database & sync state	$10-30
Azure OpenAI	`oai-eispetd365-dev`	GPT-4o + embeddings	$50-150
Document Intelligence	`di-eispetd365-dev`	Vet invoice OCR	$10-30
API Management	`apim-eispetd365-dev`	API gateway	$5-15

Data Flow Architecture

EIS to Dataverse Synchronization (Pet Insurance)

Sync Flow: EIS Pet Policy -> Dataverse



Entity Mapping (Pet Insurance)

EIS Field	Dataverse Field	Type
policy_id	eis_eissourceid	String
policy_number	eis_policynumber	String
plan_type	eis_plantype	OptionSet (accident_only, accident_illness, comprehensive)
pet_id	eis_petid	Lookup
pet_name	eis_petname	String
species	eis_species	OptionSet (dog, cat, bird, rabbit)
breed	eis_breed	String
annual_limit	eis_annuallimit	Currency
deductible	eis_deductible	Currency
reimbursement_pct	eis_reimbursementpct	Integer (70, 80, 90)
customer_id	eis_petownerid	Lookup

3. Business Flows

Pet Claim FNOL Processing

The pet insurance FNOL process captures veterinary expense claims and initiates the claims handling workflow. AI-powered extraction automatically structures free-text descriptions of pet conditions, while pre-existing condition detection and fraud analysis score each claim for risk assessment.

1. **Vet Visit Reported**

   Pet owner contacts agent via phone, web, or mobile app to report a veterinary expense claim.

2. **Agent Portal Entry**

   Agent enters claim details including pet condition description, policy number, date of service, and vet clinic.

3. **AI Processing**

   GPT-4o extracts structured data: diagnosis, treatment, body part affected, severity, and urgency level.

4. **Pre-Existing Check**

   System checks waiting periods, prior claims history, and breed-specific hereditary condition risk.

5. **Vet Invoice OCR**

   Azure Document Intelligence extracts line items from uploaded vet invoices with 94% accuracy.

6. **Claim Creation & Sync**

   Pet claim created in system with estimated payout and synchronized to Dynamics 365 Dataverse.

AI Extraction Example - Pet Insurance Claim

```
+--------------------------------------------------------------------------------
|  INPUT (Free Text)
|  ------------------------------------------------------------------------------
|  "My golden retriever Max started limping yesterday after playing at the dog par
|   The vet did x-rays and diagnosed a torn CCL. They recommend TPLO surgery.
|   The estimate is $4,500 including surgery, anesthesia, and post-op care."
+--------------------------------------------------------------------------------
                                          |
                                       GPT-4o
                                          |
                                          v
+--------------------------------------------------------------------------------
|  OUTPUT (Structured)
|  ------------------------------------------------------------------------------
|  {
|    "pet_name": "Max",
|    "species": "dog",
|    "breed": "Golden Retriever",
|    "diagnosis": "Torn CCL (Cranial Cruciate Ligament)",
|    "affected_body_part": "back leg",
|    "condition_type": "accident",
|    "symptoms": ["limping", "non-weight-bearing"],
|    "recommended_treatment": "TPLO surgery",
|    "estimated_amount": 4500.00,
|    "severity": "moderate",
|    "urgency": "scheduled",
|    "hereditary_risk": "elevated",
|    "confidence_score": 0.94
|  }
+--------------------------------------------------------------------------------
```

Pre-Existing Condition Check

Check Type	Description	Action if Failed
Waiting Period	Accident: 0-3 days, Illness: 14 days, Orthopedic: 6 months	Deny claim with WAITING_PERIOD_NOT_MET
Prior Claims	Check for related conditions in claim history	Flag for review, may deny as pre-existing
Breed Risk	Check hereditary conditions common for breed	Flag for additional documentation

Fraud Risk Levels

Score Range	Risk Level	Action
0% - 30%	Low	Standard processing
30% - 50%	Medium	Request additional vet documentation
50% - 100%	High	Refer to Special Investigations Unit

Pet Quote Generation Flow

The pet insurance rating engine calculates premiums based on pet characteristics (species, breed, age), location, coverage selections, and applicable discounts. The system supports breed-specific risk factors for 200+ dog and cat breeds.

Premium Calculation Breakdown - Pet Insurance

```
+-------------------------------------------------------------------------------
|  BASE RATE (Golden Retriever, Illinois)                              $420.00
+-------------------------------------------------------------------------------
                                          |
                                          v
+-------------------------------------------------------------------------------
|  PET FACTORS
|    Species (dog):              1.00 (standard)
|    Breed Risk (Golden):        1.15 (elevated - hip/cancer risk)
|    Size (large, 72 lbs):       1.08 (large breed surcharge)
|    Combined Breed Factor:      1.24
+-------------------------------------------------------------------------------
                                          |
                                          v
+-------------------------------------------------------------------------------
|  AGE FACTORS
|    Age (5 years):              1.20 (age 4-7 bracket)
|    Age Rating Applied:         1.20
+-------------------------------------------------------------------------------
                                          |
                                          v
+-------------------------------------------------------------------------------
|  LOCATION FACTORS
|    State (IL):                 1.05 (state factor)
|    Urban (Chicago):            1.10 (urban vet costs)
|    Combined Location:          1.16
+-------------------------------------------------------------------------------
                                          |
                                          v
+-------------------------------------------------------------------------------
|  COVERAGE SELECTIONS (Accident + Illness Plan)
|    Plan Type Factor:                                    1.00
|    Annual Limit ($10,000):                              1.00
|    Deductible ($250):                                  -$48.00 credit
|    Reimbursement Rate (80%):                            1.00
+-------------------------------------------------------------------------------
                                          |
                                          v
+-------------------------------------------------------------------------------
|  DISCOUNTS APPLIED
|    Spayed/Neutered (5%):                                -$33.84
|    Microchipped (3%):                                   -$20.30
|    Total Discounts (8%):                                -$54.14
+-------------------------------------------------------------------------------
                                          |
                                          v
+-------------------------------------------------------------------------------
|  FINAL PREMIUM
|    Base with All Factors:                               $676.76
|    Less Discounts:                                      -$54.14
|    Policy Fee:                                          +$15.00
|    ============================================================================
```

```
|    TOTAL ANNUAL PREMIUM:                                          $637.62
|    Monthly (if financed):                                          $53.14
+-------------------------------------------------------------------------------
```

Breed Risk Categories

Category	Risk Factor	Example Breeds
Low Risk	0.90 - 1.00	Mixed breeds, Beagles, Australian Shepherds
Standard Risk	1.00 - 1.15	Labrador Retrievers, Golden Retrievers
Elevated Risk	1.15 - 1.35	French Bulldogs, Cavalier King Charles Spaniels
High Risk	1.35 - 1.60	English Bulldogs, Great Danes, Bernese Mountain Dogs

4. API Reference

Pet Claims API (WS2)

Base URL: `http://localhost:8001/api/v1`

`POST` `/claims/fnol`

Description: Submit a First Notice of Loss for a pet veterinary expense claim

Request Body


```
{ "description": "My golden retriever Max started limping yesterday...",
"date_of_service": "2024-06-15", "policy_number": "PET-IL-2024-00001",
"pet_id": "PET-001", "condition_type": "accident", "vet_clinic_name":
"Happy Paws Veterinary Clinic", "amount_billed": 4500.00, "contact_email":
"john.smith@example.com" }
```


Response (201 Created)


```
{ "claim_number": "CLM-PET-2024-00001", "status": "submitted", "pet_name":
"Max", "pet_breed": "Golden Retriever", "ai_extraction": { "diagnosis":
"Torn CCL (Cranial Cruciate Ligament)", "recommended_treatment": "TPLO
surgery", "severity": "moderate", "confidence_score": 0.94 },
"pre_existing_check": { "status": "passed", "waiting_period_met": true,
"hereditary_risk": "elevated" }, "coverage_check": { "covered": true,
"annual_limit": 10000.00, "deductible": 250.00, "reimbursement_rate": 0.80
}, "estimated_payout": 3400.00 }
```


`POST` `/claims/{claim_number}/documents`

Description: Upload a vet invoice for OCR processing

Content-Type: multipart/form-data

`POST` `/claims/{claim_number}/pre-existing`

Description: Analyze claim for pre-existing conditions

Pet Rating API (WS5)

Base URL: `http://localhost:8003/api/v1`

`POST` `/rating/quote`

Description: Generate a pet insurance premium quote

Request Body


```
{ "state": "IL", "zip_code": "60601", "effective_date": "2024-07-01",
"pet": { "name": "Max", "species": "dog", "breed": "Golden Retriever",
"date_of_birth": "2019-03-15", "gender": "male", "spayed_neutered": true,
"microchipped": true }, "coverage": { "plan_type": "accident_illness",
"annual_limit": 10000, "deductible": 250, "reimbursement_pct": 80 } }
```


`GET` `/rating/breeds`

Description: Retrieve breed-specific rating factors

Query Params: `species` , `breed`

EIS Integration API (WS3)

Base URL: `http://localhost:8002/api/v1`

`GET` `/eis/policies`

Description: List all pet policies with optional filtering

Query Params: `status` , `customer_id` , `plan_type` , `limit` , `offset`

`GET` `/eis/pets`

Description: List all pets with optional filtering by species, breed, or policy

`GET` `/eis/customers/{customer_id}`

Description: Retrieve pet owner details (Customer 360)

`GET` `/eis/vet-providers`

Description: List registered veterinary providers

HTTP Status Codes

Code	Meaning	Description
200	OK	Request successful
201	Created	Pet claim or quote created successfully
400	Bad Request	Invalid request format
401	Unauthorized	Authentication required
404	Not Found	Pet, policy, or claim not found
422	Validation Error	Request validation failed (e.g., invalid breed)
500	Server Error	Internal server error

5. Security & Compliance

Authentication

The system uses OAuth 2.0 with Azure Active Directory for user authentication. Service-to-service communication uses Managed Identities, eliminating the need for stored credentials.

U User Authentication

OAuth 2.0 / OpenID Connect via Azure AD with MFA support

S Service Identity

Azure Managed Identities for automatic credential management

Authorization (RBAC)

Endpoint	Agent	Supervisor	Admin
`POST /claims/fnol`	Yes	Yes	Yes
`GET /claims/*`	Own	All	Yes
`PUT /claims/*/approve`	No	Yes	Yes
`PUT /rating/factors`	No	No	Yes
`POST /sync/trigger`	No	No	Yes

Data Protection

Data State	Encryption	Key Management
At Rest	AES-256	Azure Key Vault
In Transit	TLS 1.3	Azure-managed certificates
Backups	AES-256	Customer-managed key (optional)

Sensitive Data Classification

> **Restricted Data Handling**
>
> Pet owner PII (SSN, bank accounts) is encrypted, masked in logs/UI, and all access is audit logged. Veterinary medical records are protected under applicable pet health privacy regulations.

Secrets Management

Secret	Purpose	Rotation
AZURE-OPENAI-KEY	AI service authentication	90 days
COSMOS-DB-KEY	Breed database access	60 days (automated)
SERVICE-BUS-CONNECTION	Message queue access	60 days (automated)
DATAVERSE-CLIENT-SECRET	D365 authentication	180 days

6. Appendix

Glossary

Term	Definition
FNOL	First Notice of Loss - Initial pet claim report from pet owner
CCL	Cranial Cruciate Ligament - Common knee injury in dogs
TPLO	Tibial Plateau Leveling Osteotomy - Surgical treatment for CCL tears
Pre-existing	Condition present before policy effective date or during waiting period
Waiting Period	Time after policy start before coverage begins (varies by condition type)
Hereditary	Conditions common to specific breeds (e.g., hip dysplasia in large dogs)
EIS	Enterprise Insurance System - Core insurance platform
Dataverse	Microsoft's data platform underlying Dynamics 365
SIU	Special Investigations Unit - Fraud investigation team

Sample Pets (Mock Data)

Pet ID	Name	Species	Breed	Age
PET-001	Max	Dog	Golden Retriever	5
PET-002	Whiskers	Cat	Maine Coon	4
PET-003	Bella	Dog	French Bulldog	3
PET-004	Luna	Dog	Labrador Retriever	2
PET-005	Charlie	Cat	Domestic Shorthair	6

Configuration Reference

Environment Variables

```
# Azure Configuration AZURE_SUBSCRIPTION_ID=your-subscription-id
AZURE_TENANT_ID=your-tenant-id # Dataverse DATAVERSE_URL=https://your-
org.crm.dynamics.com DATAVERSE_CLIENT_ID=your-client-id
DATAVERSE_CLIENT_SECRET=******** # Azure OpenAI
AZURE_OPENAI_ENDPOINT=https://your-openai.openai.azure.com
AZURE_OPENAI_KEY=******** AZURE_OPENAI_DEPLOYMENT=gpt-4o # Document
Intelligence (Vet Invoice OCR) DOCUMENT_INTELLIGENCE_ENDPOINT=https://your-
di.cognitiveservices.azure.com DOCUMENT_INTELLIGENCE_KEY=******** # Service Bus
SERVICE_BUS_CONNECTION_STRING=Endpoint=sb://... # Environment ENVIRONMENT=dev
```

Service Ports

Service	Port	Health Check
WS2: AI Pet Claims	8001	`/health`
WS3: EIS Integration	8002	`/health`
WS5: Pet Rating	8003	`/health`
WS4: Agent Portal	3000	`/`

Document Information

Version	1.0
Last Updated	December 2024
Classification	Internal
Author	Platform Engineering Team