

Insurance Claim Processing System

End-to-End Claim Management with REST, SOAP, gRPC & GraphQL

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TECHNOLOGIES

- | REST
- | SOAP
- | gRPC
- | GraphQL
- | Bonita BPM

System Overview

11 microservices, 4 API types

Orchestrated by **Bonita BPM 2021.2-u0**

Docker Compose deployment, shared network

- Each API type chosen for specific technical reasons
- Spring Boot 3.2.3 · Java 21 · grpc-java 1.62.2
- Spring for GraphQL 1.2 · Spring-WS SOAP

Service	Port	Type
Bonita BPM	:8080	BPM
claim-submission	:8081	REST
identity-verify	:8082	SOAP
policy-validation	:8083	REST
fraud-detection	:9090	gRPC
eligibility	:8084	REST
document-review	:8085	GraphQL
expert-assessment	:8086	REST
compensation	:8087	REST
payment-auth	:8088	REST
notification	:8089	REST
claim-tracking	:8090	GraphQL

REST — 8 Services

Spring Boot 3.2.3 + Java 21

- Standard HTTP verbs: POST to create, GET to read
- JSON request/response bodies
- OpenAPI 3.1 contracts documented
- Health checks via /actuator/health

```
POST /claims HTTP/1.1
Content-Type: application/json

{
  "policyNumber": "POL-123456",
  "claimType": "AUTO",
  "estimatedAmount": 8500.00,
  "claimantName": "Jean Dupont"
}
201 Created
{"claimId":"CLM-2024-001",
 "status":"SUBMITTED"}
```

SOAP — identity-verification

Spring-WS, WSDL-first contract

- Policy format POL-XXXXXX validated
- WS-Security capable

Why SOAP: typed contract, legacy integration point

- Response: VERIFIED or FAILED + code

```
<SOAP-ENV:Envelope>
  <SOAP-ENV:Body>
    <tns:verifyIdentityRequest>
      <tns:policyNumber>
        POL-123456
      </tns:policyNumber>
      <tns:claimantName>
        Jean Dupont
      </tns:claimantName>
    </tns:verifyIdentityRequest>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>

verificationStatus: VERIFIED
verificationCode: VC-847291
```

gRPC — fraud-detection

grpc-java 1.62.2 + Protobuf 3

- Binary payload: ~3x smaller than JSON

Why gRPC: high-throughput risk scoring

- Risk tiers: LOW / MEDIUM / HIGH / CRITICAL
- Threshold: amount over 100k = CRITICAL

```
service FraudDetectionService {
    rpc AssessFraudRisk(FraudRequest)
        returns (FraudResponse);
}

// Amount >100k  CRITICAL
// Amount >50k   HIGH
// Amount >10k   MEDIUM
// Otherwise     LOW

// grpcurl test:
// grpcurl -plaintext localhost:9090
//   FraudDetectionService/AssessFraudRisk
```

GraphQL — 2 Services

- Spring for GraphQL 1.2

document-review :8085 — submit/validate docs

claim-tracking :8090 — track status history

Why GraphQL: flexible status history queries

- GraphiQL IDE available at /graphiql

```
# document-review (port 8085)
mutation {
  submitDocument(claimId: "CLM-001",
    documentType: POLICE_REPORT) {
    id
    status
    valid
  }
}

# claim-tracking (port 8090)
{ trackClaim(claimId: "CLM-2024-001") {
  currentStatus
  statusHistory {
    status
    timestamp
  }
}
}
```

Bonita BPM — Workflow Orchestration

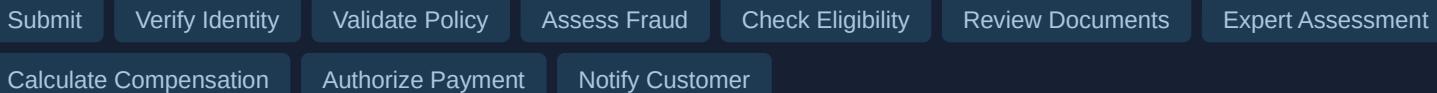
Customer Pool

Submits claim request via message event. Receives final result notification upon process completion.

Insurance Pool

Runs the full 10-step processing pipeline, orchestrating all microservice calls via HTTP connectors.

PROCESSING PIPELINE



XOR gateway: fraud HIGH/CRITICAL triggers manual review path | AND gateway: parallel notification channels

Bonita Connector Configuration (2021.2-u0)

REST Connector Output

```
// Access JSON response fields  
// (bodyAsObject pattern)  
  
bodyAsObject.claimId  
bodyAsObject.status  
bodyAsObject.eligible  
bodyAsObject.riskLevel
```

SOAP Connector Output

```
import org.w3c.dom.*;  
responseDocumentBody  
    .normalizeDocument();  
NodeList list =  
    responseDocumentBody  
    .getElementsByTagNameNS(  
        "*", "verificationStatus");  
Element el = (Element) list.item(0);  
return el.getTextContent();  
// returns "VERIFIED" / "FAILED"
```

Why Each API Type?

Service	API Type	Reason
claim-submission	REST	Simple CRUD, public-facing
identity-verification	SOAP	Typed contract, compliance
fraud-detection	gRPC	Performance, binary encoding
document-review	GraphQL	Flexible field selection
claim-tracking	GraphQL	Rich status history graph
6 other services	REST	Standard HTTP, easy integration

Docker Compose

- All 11 services containerized
- Health checks: /actuator/health
- Shared network: insurance-claim-network

BUILD AND START

```
docker compose up --build
```

```
services:  
claim-submission:  
  build: services/claim-submission  
  ports: ["8081:8081"]  
  healthcheck:  
    test: ["CMD", "curl", "-f",  
           "http://localhost:8081  
           /actuator/health"]  
networks:  
  insurance-claim-network  
networks:  
  insurance-claim-network:  
    driver: bridge
```

Testing Each API

REST

```
curl -X POST \
  http://localhost:8081/claims \
  -H "Content-Type: application/json" \
  -d '{"policyNumber":"POL-123456",...}'
```

SOAP

```
curl -X POST \
  http://localhost:8082/ws/identity \
  -H "Content-Type: text/xml" \
  -d '<SOAP-ENV:Envelope>...</SOAP-ENV:Envelope>'
```

gRPC

```
grpcurl -plaintext \
  -d '{"claim_id":"CLM-001",...}' \
  localhost:9090 \
  FraudDetectionService/AssessFraudRisk
```

GraphQL

```
// GraphQL interactive IDE
http://localhost:8085/graphiql
http://localhost:8090/graphiql
```

Questions?

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