

# RAHUL KARN

Enterprise Systems Architect | InsurTech & Financial Services | AI-Driven Transformation

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4+ hrs/day US Eastern overlap · Independent Contractor · W-8BEN on request

## WHAT I DELIVER

Enterprise Systems Architect with **8+ years** designing, building, and modernizing mission-critical platforms in insurance and financial services. I architect **new systems from the ground up**, modernize legacy platforms to .NET 10/8 LTS and cloud-native stacks, and embed AI/ML into core business workflows—underwriting, claims, fraud detection, and predictive analytics. Engagements produce **production-ready system designs**: C4 blueprints, domain models, security architectures, data platform strategies, and phased execution plans. Proven at scale: **90,000+ user platform**, **50% database performance gains**, **NPR 100B+ asset portfolio** systems, and **6+ engineer teams** guided through complex transformations.

**Engagement model:** Assessment & Discovery → System Design & Blueprint → Execution Leadership & Delivery Guardrails

## SIGNATURE IMPACT

- **System Design at Scale:** Architected enterprise portal, API ecosystem, and core insurance platform serving **90,000+ users**—designed domain model, service boundaries, RBAC, API governance, OWASP-aligned controls, and high-availability patterns for regulated financial transactions.
- **AI/ML Strategy for Insurance:** Designed executive-level AI roadmap for fraud detection, predictive underwriting, claims triage automation, and insurance analytics—bridging data science capabilities with production system architecture.
- **Performance Engineering:** Delivered **50% query-time reduction** across Oracle/SQL Server through systematic index analysis, execution-plan optimization, and stored-procedure refactoring—directly improving throughput for mission-critical operations.
- **End-to-End Digital Transformation:** Led architecture and delivery of full insurance digitization: underwriting, policy lifecycle, claims, payments, agent onboarding, and digital channels—from system design through production launch.
- **Architecture Modernization:** Designed target-state architecture and led phased transformation (monolith → modular → microservices-ready), establishing bounded contexts, integration contracts, and delivery guardrails across **6+ engineers**.

## ARCHITECTURE & DESIGN COMPETENCIES

- **System Design & Domain Modeling:** Greenfield and brownfield architecture, DDD, capability mapping, bounded contexts, data ownership, event-driven/CQRS patterns, GoF design patterns (Factory, Strategy, Observer, Decorator, Builder), target-state architecture.
- **AI/ML System Architecture:** ML pipeline design for insurance/finance—fraud detection, predictive underwriting, claims automation, risk scoring; RAG, Semantic Kernel, vector databases; ML.NET and Python model integration into production APIs.
- **Security & Compliance:** Zero-trust design, RBAC/ABAC, OAuth2/OIDC (Duende IdentityServer, BFF pattern, mTLS), OWASP Top 10, STRIDE threat modeling, encryption, secrets management, audit trails, regulatory compliance.
- **Platform, API & Data Architecture:** API-first design, gateway patterns, idempotency, payment protocols, database architecture (Oracle/SQL Server/Azure SQL), query optimization, ETL/ELT, capacity planning, SLO/SLA engineering.
- **InsurTech & Financial Services:** Core insurance systems (underwriting, policy admin, claims, payments), asset management, premium engines, regulatory reporting, fraud detection, KYC/AML, digital channel strategy.

## TECHNOLOGY

**System Design:** C4 modeling, DDD, ADRs, API-first, event-driven, CQRS, YARP (reverse proxy), microservices; patterns: Factory, Strategy, Observer, Mediator, Decorator, Builder, Specification, Unit of Work

**Backend:** C#, .NET 10/8/6/5 (LTS migration path), ASP.NET Core, Entity Framework Core, Web API, MediatR, repository/service/CQRS patterns

**Data:** Oracle, SQL Server, Azure SQL, T-SQL, query optimization, indexing strategies, execution-plan analysis, ETL/data migration

**AI/ML:** ML.NET, Semantic Kernel, RAG, vector databases, prompt engineering; Python, pandas, scikit-learn, ML pipeline architecture, fraud detection

**Security:** Zero-trust, RBAC/ABAC, OAuth2/OIDC, Duende IdentityServer, BFF pattern, Reference Tokens, mTLS, OWASP Top 10, STRIDE, secrets management, audit logging

**Cloud & DevOps:** Azure (App Services, Functions, Key Vault, AD, SQL), Docker, Kubernetes, Azure DevOps CI/CD, Terraform, IaC

**Integration:** REST APIs, gRPC, payment gateways, reconciliation patterns, webhook/callback flows, message queues (RabbitMQ, Service Bus)

**Observability:** OpenTelemetry, Application Insights, Grafana/Prometheus, structured logging, SLO/KPI dashboards

## PROFESSIONAL EXPERIENCE

### Officer --- Lead Architect & Platform Engineer

Jan 2023 – Present

Nepal Life Insurance Co. Ltd., Kathmandu, Nepal

### Platform Architecture & AI-Driven Transformation

Jul 2024 – Present

- **System design leadership:** Architect and lead development of mission-critical insurance platform modules (policy administration, underwriting, claims, digital channels); own system design decisions, integration architecture, and cross-vendor coordination.

- **AI/ML strategy & architecture:** Designed AI roadmap for insurance operations—fraud detection, predictive underwriting, claims triage automation, and customer analytics; authored executive use-case playbook and defined ML integration architecture for production systems.
- **Digital transformation:** Drove enterprise-wide system modernization—digitized policy issuance, claims processing, and agent onboarding; designed SLA frameworks with KPIs for uptime, resolution times, and delivery timelines.
- **Performance & cost architecture:** Led database performance programs (query tuning, index optimization) and infrastructure cost-efficiency initiatives including license utilization reviews, delivering measurable savings across platforms.

System Architecture & Secure Platform Delivery

Jan 2023 – Jun 2024

- **Platform design & modernization:** Designed target-state system architecture for legacy insurance platform; created phased migration roadmap (monolith → modular → microservices-ready), defining domain boundaries, data ownership, and integration contracts; guided **6+ engineers** through execution.
- **Secure platform architecture:** Designed and delivered enterprise portal and API ecosystem serving **90,000+ active users**; architected RBAC model, API governance standards, OWASP-aligned security controls, and high-availability operational guardrails.
- **Domain-driven service design:** Defined bounded contexts, aggregate boundaries, and integration contracts across underwriting, product configuration, and policy lifecycle; unified APIs under API-first strategy with versioning and backward compatibility.
- **Transaction & payment architecture:** Designed payment gateway flows with reconciliation patterns, idempotency controls, and audit-trail logging. Delivered **50% query-time reduction** across Oracle/SQL Server through systematic performance engineering.
- **Operational architecture:** Established organization-wide operability standards: structured logging, monitoring dashboards, SLO definitions, reliability gates, and incident triage playbooks.

Software Engineer

Nov 2018 – Dec 2022

Nepal Life Insurance Co. Ltd., Kathmandu, Nepal

- Designed and built enterprise applications for **asset management** (NPR 100B+ portfolio), **policy administration**, and **premium calculation** using .NET Core/MVC with Oracle/SQL Server—handling sensitive financial data with security and audit controls.
- Led development of premium calculator engine across **20+ product lines**; standardized actuarial rules, reducing manual errors and improving sales efficiency by **~30%**.
- Designed secure onboarding system for **5,000+ agents/customers** with eligibility validation, KYC workflows, and payment gateway integration.
- Built API integrations connecting underwriting, policy issuance, and claims across core systems with error handling, retry logic, and reconciliation patterns.

Software Engineer

Oct 2017 – Nov 2018

Innovative Ghar Nepal, Kathmandu, Nepal

- Owned end-to-end system design and development of a multi-tenant real-estate platform (ASP.NET MVC/C#); designed data model, repository-pattern architecture, RBAC, and shipped property listing, tenant management, and reporting modules.

SELECTED ARCHITECTURE DELIVERABLES

- **System architecture & ADRs:** C4 diagrams (Context, Container, Component), domain model, capability map, service boundaries, data ownership matrix, and **15+ ADRs** covering integration, reliability, security, and technology decisions.
- **Security & API architecture:** API versioning policy, error model, idempotency guidance, OWASP checklists, threat model templates, RBAC design documents, and security review gates adopted across engineering teams.
- **AI strategy & transformation roadmaps:** Executive AI use-case roadmap for insurance operations, modernization plans with business cases, phased timelines, risk matrices, and 12-month scalability projections.
- **Performance & optimization:** Database performance audits, infrastructure right-sizing, license utilization analyses, and ROI-driven cost optimization proposals.

CERTIFICATIONS & RESEARCH

Microsoft Certified: Azure Solutions Architect Expert (AZ-305) — In Progress  
IEEE Publication: Peer-reviewed research in image processing & security — ICCMC 2018 (IEEE Xplore).

EDUCATION

MSc, Data Science & Computational Intelligence — Coventry University, UK (Distance)	Expected Feb 2027
MBA, Finance — IGNOU (Distance)	Expected Jul 2026
BE, Computer Science & Engineering — Advanced College of Engineering, Tribhuvan University	2013 – 2017