

## Comprehensive Software Architecture Project Guide

### 1. Java (Spring Boot, Jakarta EE, Hibernate, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Enterprise Banking System	Java 17, Spring Boot, Hibernate, PostgreSQL, Redis, Angular, TypeScript, Maven, Docker, Kafka, Prometheus, Grafana, WebFlux/Reactor, JWT, Flyway, JUnit, Testcontainers	A reactive microservices architecture using Spring WebFlux and Project Reactor for high throughput transaction processing with non-blocking I/O. Uses Kafka for event streaming and implements CQRS pattern with separate read/write models.	Handles complex banking operations including account management, transactions processing, fraud detection using ML models, loan processing, and regulatory compliance. Multi-tenant architecture supports white-labeling for different banking partners.	AWS EKS for container orchestration, RDS for PostgreSQL, ElastiCache for Redis, CloudFront for frontend delivery, GitHub Actions for CI/CD pipeline, Terraform for infrastructure.	IntelliJ IDEA Ultimate
Supply Chain Management Platform	Java 17, Quarkus, GraalVM native-image, Hibernate, PostgreSQL, React, TypeScript, Gradle, Docker, OpenAPI, Liquibase, JUnit 5, SmallRye Reactive Messaging, Keycloak	Fast-startup microservices with native compilation using GraalVM. Implements event-driven architecture with SmallRye Reactive Messaging. Uses Panache ORM with active record pattern for simplified data access.	Manages end-to-end supply chain including inventory tracking, supplier management, order processing, logistics optimization using ML-based demand forecasting, and real-time analytics dashboards for business intelligence.	Google Cloud GKE for Kubernetes deployment, Cloud SQL for PostgreSQL, Pub/Sub for messaging, Cloud CDN, Cloud Build for CI/CD, Terraform for IaC.	Eclipse IDE with Quarkus Tools
Telemedicine Platform	Java 11, Micronaut, JPA/Hibernate, MySQL, Vue.js, WebSockets, Maven, JUnit, Swagger/OpenAPI, Docker, SLF4J, Flyway	Lightweight microservices with fast startup using Micronaut's ahead-of-time compilation. Leverages server-sent events and WebSockets for real-time communication and notifications.	Enables secure video consultations between patients and healthcare providers, appointment scheduling, electronic health records management, prescription generation, and integration with payment gateways.	DigitalOcean Kubernetes, managed MySQL, Spaces for object storage, DO App Platform for frontend, GitHub Actions for CI/CD.	IntelliJ IDEA Community
Smart City IoT Management	Java 17, Vert.x, MongoDB, Kotlin, ReactJS, Gradle, Docker, JUnit 5, Testcontainers, OpenAPI, RabbitMQ, Prometheus, Grafana	Event-loop based reactive system using Vert.x for handling thousands of concurrent IoT connections with minimal resource usage. Uses polyglot persistence with MongoDB for device data and PostgreSQL for user management.	Collects and analyzes data from IoT sensors across a city, providing dashboards for traffic management, waste management, air quality monitoring, and energy usage optimization with predictive analytics using embedded ML models.	Azure AKS for Kubernetes, Cosmos DB for MongoDB API, Azure Service Bus for messaging, Azure Front Door for CDN, Azure DevOps for CI/CD, Pulumi for infrastructure.	Visual Studio Code with Java extensions

### 2. Multithreading

Project	Tech Stack	Description	Business Logic	Deployment	IDE
High-Frequency Trading Platform	Java 17, LMAX Disruptor, JCTools, Chronicle Queue, ZGC, C++ (for critical paths), Protocol Buffers, Linux kernel tuning, FPGA integration, Grafana	Ultra-low latency system using mechanical sympathy principles with custom thread affinity and CPU pinning. Implements ring buffers with LMAX Disruptor and uses Chronicle Queue for persistent messaging with nanosecond precision timestamps.	Executes trading strategies across multiple markets with sub-microsecond latency, implementing algorithmic strategies, risk management, market data processing, and order routing with ML-based market prediction models.	Bare metal servers in financial data centers with proximity to exchanges, Ansible for configuration, Jenkins for CI/CD, custom deployment scripts.	IntelliJ IDEA Ultimate with C++ plugin
Distributed Big Data Processing Framework	Java 17, Akka, Hazelcast, Netty, GIGC tuning, Kafka, PostgreSQL, Python (for ML components), Prometheus, Grafana	Actor-based concurrency model using Akka for distributed computation across nodes. Implements work-stealing thread pools and backpressure mechanisms with non-blocking IO for network communication.	Processes massive datasets across distributed nodes with dynamic task allocation, fault tolerance, and data partitioning. Supports ETL workflows, complex aggregations, and ML model training with checkpointing and recovery.	AWS EKS for container orchestration, EC2 instances with custom AMI, S3 for data lake, MSK for Kafka, RDS for PostgreSQL, CodePipeline for CI/CD, CloudFormation for infrastructure.	IntelliJ IDEA Ultimate
Real-time Video Encoding Platform	C++ 20, Java 17, FFMPEG, OpenCV, Shenandoah GC, CUDA, TPUs, gRPC, Redis, ReactJS, Docker	Hybrid system using custom thread pools with work-stealing algorithm and fork-join framework. Implements producer-consumer pattern with bounded buffers for frame processing pipeline.	Transcodes and processes video streams in real-time with adaptive bitrate streaming, content-aware encoding, ML-based object recognition, and automated content moderation across multiple formats and resolutions.	Google Cloud GKE with GPU nodes, Cloud Storage, Redis Enterprise, Cloud CDN, Cloud Build for CI/CD, Terraform for infrastructure.	CLion for C++ components, IntelliJ IDEA for Java
Distributed Graph Processing Engine	Scala, Akka, Java 17, ZGC, Netty, Kryo serialization, GraphQL, React, Docker	Implements specialized thread pool with custom task scheduler optimized for graph traversal operations. Uses lock-free data structures and atomic operations for concurrent graph modifications.	Analyzes large-scale graphs for social network analysis, recommendation systems, fraud detection, and knowledge graph exploration with ML-based node embedding for graph analytics.	Azure AKS for container orchestration, Cosmos DB Gremlin API for graph storage, Event Hub for messaging, Azure CDN, Azure DevOps for CI/CD, Terraform for infrastructure.	IntelliJ IDEA with Scala plugin

### 3. Python (Django, Flask, FastAPI, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Healthcare Analytics Platform	Python 3.11, FastAPI, PostgreSQL, SQLAlchemy, Pandas, NumPy, TensorFlow, React, TypeScript, Docker, Redis, Celery, Flower	Asynchronous API architecture with FastAPI leveraging Python's asyncio for high-concurrency operations. Implements background task processing with Celery for long-running analytics jobs.	Ingests healthcare data from multiple sources (EHR, wearables, clinical trials) to provide predictive analytics for patient outcomes, treatment effectiveness, and population health trends with ML models for disease risk prediction.	AWS EKS for Kubernetes, Aurora PostgreSQL, ElastiCache for Redis, S3 for data lake, SageMaker for model hosting, CodePipeline for CI/CD, CloudFormation for infrastructure.	PyCharm Professional
E-commerce Recommendation Engine	Python 3.11, Django 4, PostgreSQL, Django REST Framework, Celery, Redis, React, Docker, PyTorch, Jupyter Notebooks, Pandas	Monolithic architecture with Django and DRF for API layer, leveraging Django's ORM for data access. Uses Celery for background tasks like recommendation generation and email campaigns.	Delivers personalized product recommendations based on user behavior, purchase history, and demographic data. Includes A/B testing framework, customer segmentation, and real-time offer optimization using ML models.	Digital Ocean App Platform, managed PostgreSQL, Redis, Spaces for media storage, GitHub Actions for CI/CD.	PyCharm Professional
Financial Fraud Detection System	Python 3.11, Flask, MongoDB, SQLAlchemy, Kafka, Elasticsearch, Vue.js, Docker, Scikit-learn, XGBoost, Pandas, NumPy	Microservices architecture using Flask blueprints for modular API design. Implements event sourcing with Kafka for transaction stream processing and audit trails.	Detects fraudulent financial transactions in real-time using rule-based engines and ML algorithms. Features anomaly detection, pattern recognition, case management for fraud analysts, and regulatory reporting.	Google Cloud GKE, Cloud SQL, Pub/Sub, BigQuery, AI Platform for ML models, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code with Python extensions
NLP-powered Customer Service Platform	Python 3.11, FastAPI, PostgreSQL, Asyncio, RabbitMQ, React, Docker, Hugging Face Transformers, LangChain, Pinecone, PyTorch	Event-driven microservices architecture with FastAPI and asyncio. Uses CQRS pattern with separate read and write models for scaling.	Automates customer service interactions through chatbots, email classification, sentiment analysis, and intelligent ticket routing. Includes knowledge base management, agent performance analytics, and continuous learning from interactions.	Azure AKS, Azure Database for PostgreSQL, Service Bus, Cognitive Search, App Insights, Azure DevOps for CI/CD, Terraform.	Visual Studio Code with Python extensions

### 4. Machine Learning (Scikit-learn, TensorFlow, PyTorch, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Advanced Medical Imaging Analysis Platform	Python 3.11, PyTorch, FastAPI, PostgreSQL, Redis, React, Docker, ONNX, TorchScript, Ray, MONAI, SimpleITK	Distributed ML training architecture using Ray for parallel processing across GPUs. Uses model quantization and ONNX for optimized inference with hardware acceleration.	Analyzes medical images (MRI, CT, X-ray) to detect anomalies, assist in diagnosis, and segment organs/tissues. Features automated report generation, comparison with historical data, and integration with hospital information systems.	AWS EKS with GPU nodes, S3 for image storage, SageMaker for model hosting, ECR for container registry, Step Functions for workflows, CodePipeline for CI/CD, CDK for infrastructure.	PyCharm Professional, Jupyter Lab
Multimodal Content Moderation Platform	Python 3.11, TensorFlow, JAX, FastAPI, MongoDB, Kafka, React, Docker, Hugging Face Transformers, OpenCV, ffmpeg	Hybrid ML architecture combining CNNs for image processing, transformers for text, and custom models for video analysis. Uses model distillation for efficient inference.	Automatically moderates user-generated content across text, images, and videos for social platforms. Detects prohibited content, hate speech, NSFW material, and violent imagery with human-in-the-loop review workflow for edge cases.	Google Cloud GKE with GPU nodes, Cloud Storage, Pub/Sub, AI Platform, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code, Jupyter Lab
Financial Market Prediction System	Python 3.11, Scikit-learn, LightGBM, XGBoost, CatBoost, FastAPI, PostgreSQL, Redis, React, Docker, Pandas, NumPy, Dask	Ensemble modeling approach combining traditional ML with deep learning. Implements feature engineering pipeline with time-series specific transformations.	Predicts market movements, asset prices, and trading signals using historical data, fundamental analysis, and alternative data sources. Includes backtesting framework, portfolio optimization, and risk assessment tools.	Azure AKS, Azure Database for PostgreSQL, Azure Cache for Redis, Azure Blob Storage, Azure ML, Azure DevOps for CI/CD, Bicep for infrastructure.	PyCharm Professional, Jupyter Lab
Conversational AI Assistant Framework	Python 3.11, PyTorch, Hugging Face Transformers, LangChain, LangGraph, Langsmith, FastAPI, MongoDB, Redis, React, Docker	Fine-tuned transformer architecture with retrieval-augmented generation for domain-specific knowledge. Implements LangChain for structured reasoning and multi-step workflows.	Creates customizable conversational AI assistants for enterprise use cases with domain-specific knowledge integration, multi-turn conversation tracking, and integration with backend systems for transactional capabilities.	AWS EKS, DocumentDB, ElastiCache, S3, Lambda for serverless components, SageMaker for model hosting, CodePipeline for CI/CD, Terraform for infrastructure.	Visual Studio Code, Jupyter Lab

### 5. AWS (EC2, S3, EKS, Lambda, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Serverless Media Processing Pipeline	AWS Lambda, S3, SQS, SNS, DynamoDB, ECS, CloudFront, API Gateway, Python, Node.js, FFmpeg, OpenCV, TensorFlow	Event-driven serverless architecture with Lambda functions triggered by S3 events. Uses step functions for complex orchestration and SQS for decoupling components.	Processes uploaded media files for content platforms including transcoding, thumbnail generation, content moderation using ML, metadata extraction, and distribution to multiple formats and resolutions.	AWS Native (CloudFormation for infrastructure, CodePipeline for CI/CD, AWS X-Ray for tracing, CloudWatch for monitoring).	Visual Studio Code with AWS Toolkit
Healthcare Data Lake and Analytics	AWS Glue, Athena, S3, Redshift, SageMaker, EMR, Lambda, API Gateway, Python, Spark, TensorFlow, Tableau	Data lake architecture with S3 for storage, Glue for ETL, and Redshift for data warehousing. Implements ML pipelines with SageMaker for predictive analytics.	Consolidates healthcare data from multiple sources (EHR, claims, clinical trials) for analytics, regulatory reporting, and predictive modeling of patient outcomes and cost optimization with HIPAA compliance.	AWS Native (CloudFormation, AWS CodeStar for CI/CD, AWS Control Tower for governance).	PyCharm Professional, AWS Cloud9
Multi-tenant SaaS Application Platform	EKS, EC2, RDS Aurora, ElastiCache, Cognito, API Gateway, Lambda, CloudFront, Java, Spring Boot, React, PostgreSQL	Microservices architecture on EKS with service mesh for inter-service communication. Implements multi-tenant data isolation at database level with row-level security.	Provides white-label SaaS platform for business applications with tenant management, subscription billing, user management, and customizable workflows with ML-powered business intelligence dashboards.	AWS Native (AWS CDK for infrastructure, CodeBuild, CodeDeploy, CodePipeline for CI/CD).	IntelliJ IDEA Ultimate, AWS Cloud9
Real-time IoT Analytics Platform	AWS IoT Core, Kinesis, Lambda, DynamoDB, Timestream, SageMaker, Grafana, Python, Java, TensorFlow, React	Real-time streaming architecture using Kinesis for data ingestion and Lambda for processing. Uses purpose-built Timestream database for time-series data storage.	Collects telemetry from industrial IoT devices for predictive maintenance, anomaly detection, and operational optimization. Includes ML models for failure prediction and digital twin simulations.	AWS Native (SAM for serverless resources, Terraform for infrastructure, GitHub Actions for CI/CD integration with AWS).	Visual Studio Code with AWS Toolkit, PyCharm

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Multi-model Database Platform	Java, Spring Boot, PostgreSQL, (JSONB+relational), MongoDB, Redis, Neo4j, Elasticsearch, GraphQL, React, Docker	Polyglot persistence architecture with purpose-built databases for different data models. Implements unified query interface and data synchronization between stores.	Enterprise knowledge management platform handling structured data, documents, graph relationships, and full-text search with ML-based entity extraction and relationship mapping.	AWS EKS for container orchestration, RDS for PostgreSQL, DocumentDB for MongoDB compatibility, ElastiCache for Redis, Amazon Neptune for graph data, OpenSearch for search, CodePipeline for CI/CD, Terraform for infrastructure.	IntelliJ IDEA Ultimate
Real-time Analytics Database Engine	Rust, ClickHouse, Redis, Kafka, TimescaleDB, React, TypeScript, Docker	Columnar database architecture with distributed query execution and materialized views for real-time aggregations. Implements time-series optimizations with automatic data partitioning.	Provides real-time business analytics across large datasets with sub-second query response for dashboards, anomaly detection, and trend analysis with ML-based forecasting models.	GCP GKE for container orchestration, Cloud SQL for PostgreSQL (TimescaleDB), MemISTORY for Redis, Pub/Sub, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code with Rust extensions
Vector Database Search Platform	Python, FastAPI, Pinecone, Weaviate, PostgreSQL, Redis, React, Docker, Hugging Face Transformers	Vector database architecture for similarity search with hybrid ranking combining vector similarity and metadata filtering. Implements async query processing for high concurrency.	Powers semantic search applications across documents, images, and structured data with ML-based embedding generation for various content types and multi-modal search capabilities.	Azure AKS for container orchestration, Azure Database for PostgreSQL, Azure Cache for Redis, Azure Blob Storage, Azure DevOps for CI/CD, Pulumi for infrastructure.	PyCharm Professional
Distributed Graph Database Service	Java, Spring Boot, Neo4j, Kafka, Elasticsearch, Angular, Docker	Graph database architecture with sharded data storage and distributed query execution. Implements custom caching strategy for frequently accessed subgraphs.	Manages complex networks of relationships for social platforms, recommendation engines, fraud detection, and knowledge graphs with ML-based graph analytics for pattern recognition.	DigitalOcean Kubernetes, managed PostgreSQL, Spaces for backups, Redis, GitHub Actions for CI/CD, Terraform for infrastructure.	IntelliJ IDEA Ultimate

## 7. Algorithms (Sorting, Searching, Graph, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Advanced Route Optimization System	Java, Spring Boot, PostgreSQL/PostGIS, Redis, React, Docker, OSMR, Neo4j	Implements specialized graph algorithms including contraction hierarchies, A* with landmarks, and multi-level Dijkstra for efficient route planning. Uses custom spatial indexing for geospatial queries.	Optimizes delivery routes for logistics companies considering multiple constraints like time windows, vehicle capacity, driver preferences, and traffic patterns with ML for travel time prediction.	AWS EKS for container orchestration, RDS for PostgreSQL with PostGIS, ElastiCache for Redis, Neptune for graph data, CloudFront for frontend, CodePipeline for CI/CD, CloudFormation for infrastructure.	IntelliJ IDEA Ultimate
High-Performance Trading Algorithm Platform	C++, Python, Pandas, NumPy, Redis, PostgreSQL, React, Docker	Implements specialized data structures like segment trees, Fenwick trees, and custom hash tables for constant-time market data access. Uses GPU acceleration for parallel computation of trading signals.	Executes complex trading strategies based on technical indicators, order book analysis, and statistical arbitrage with ML models for market prediction and risk management.	Bare metal servers with proximity to exchanges, Ansible for deployment, Jenkins for CI/CD, custom monitoring stack.	Visual Studio for C++, PyCharm Professional for Python
Recommendation Engine with Hybrid Algorithms	Python, FastAPI, PostgreSQL, Redis, Neo4j, React, Docker, TensorFlow, Pandas	Combines collaborative filtering, content-based filtering, and graph-based recommendations using custom algorithms. Implements matrix factorization with stochastic gradient descent for latent factor models.	Powers personalized recommendations for e-commerce platforms combining user behavior, item properties, and knowledge graphs with ML for continuous optimization of recommendation quality.	Google Cloud GKE, Cloud SQL for PostgreSQL, MemISTORY for Redis, Cloud Build for CI/CD, Terraform for infrastructure.	PyCharm Professional
Natural Language Processing Pipeline	Python, FastAPI, MongoDB, Elasticsearch, React, Docker, Hugging Face Transformers, PyTorch	Implements efficient text processing algorithms including optimized trie structures for autocompletion, suffix arrays for substring search, and custom tokenization algorithms.	Provides advanced text analytics for content platforms including entity extraction, sentiment analysis, text classification, and semantic search with ML-based language understanding.	Azure AKS, Azure Cosmos DB, Azure Cognitive Search, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio Code with Python extensions

## 8. JavaScript (ES6+, Next.js, TypeScript, Node.js, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Enterprise SaaS Dashboard Platform	TypeScript, Next.js, Node.js, Express, MongoDB, Redis, GraphQL, Apollo, Tailwind CSS, Jest, Playwright, Docker	Server-side rendering architecture with Next.js for optimal performance and SEO. Implements GraphQL API with code generation for type-safe client-server communication.	Provides customizable business dashboards with role-based access control, white-labeling, data visualization, report generation, and ML-powered business intelligence insights.	AWS Amplify for Next.js hosting, ECS Fargate for backend services, DocumentDB for MongoDB, ElastiCache for Redis, CloudFront for CDN, CodePipeline for CI/CD, Terraform for infrastructure.	Visual Studio Code
Collaborative Document Editing Platform	TypeScript, React, Node.js, Socket.io, PostgreSQL, Redis, Docker, Jest, Cypress, Webpack	Real-time collaboration architecture with WebSockets for synchronization and conflict resolution using operational transformation. Implements event sourcing for document history.	Enables multiple users to edit documents simultaneously with change tracking, commenting, version control, and access management similar to Google Docs with ML-based content suggestions.	Google Cloud Run for serverless containers, Cloud SQL for PostgreSQL, MemISTORY for Redis, Cloud Storage for assets, Cloud Build for CI/CD, Terraform for infrastructure.	WebStorm
E-learning Platform with Interactive Assessments	TypeScript, Vue.js, Nuxt.js, Node.js, Express, MongoDB, Redis, GraphQL, Docker	Universal application architecture with server-side rendering for SEO and client-side navigation for user experience. Implements service worker for offline capabilities.	Delivers online courses with interactive exercises, progress tracking, adaptive learning paths, peer collaboration, and ML-based personalized content recommendations.	Azure App Service for frontend, Azure Functions for backend services, Cosmos DB for MongoDB API, Azure Cache for Redis, Azure CDN, Azure DevOps for CI/CD, Pulumi for infrastructure.	Visual Studio Code
Fintech Payment Processing Platform	TypeScript, Angular, Node.js, NestJS, PostgreSQL, RabbitMQ, Redis, Docker, Jest, Cypress, Vite	Modular monolith architecture with NestJS for structured backend development. Implements CQRS pattern with event sourcing for transactional integrity and audit trails.	Processes financial transactions with fraud detection, multi-currency support, recurring billing, payment gateway integration, and ML-based risk assessment for transactions.	AWS EKS for container orchestration, Aurora PostgreSQL, Amazon MQ for RabbitMQ, ElastiCache for Redis, CloudFront for CDN, CodePipeline for CI/CD, CDK for infrastructure.	Visual Studio Code

## 9. Web Design (HTML5, CSS, Sass, Bootstrap, Tailwind, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Design System for Enterprise Applications	React, TypeScript, Storybook, Sass, CSS Modules, Figma, Jest, Playwright, Webpack, Vite	Component-driven architecture with atomic design principles. Implements design tokens for consistent theming and accessibility compliance (WCAG 2.1 AA).	Provides reusable UI components library with comprehensive documentation, interactive examples, theme customization, and integration with design tools for streamlined designer-developer workflow.	AWS S3 for static hosting, CloudFront for CDN, GitHub Actions for CI/CD, Terraform for infrastructure.	Visual Studio Code
Interactive Data Visualization Platform	Vue.js, TypeScript, D3.js, Tailwind CSS, Vite, Jest, Cypress, Figma, WebGL, Three.js	Responsive design system using utility-first CSS with Tailwind. Implements advanced data visualizations with D3.js and WebGL for large datasets.	Creates interactive dashboards and reports with customizable charts, maps, and 3D visualizations for business intelligence applications with ML-powered insight generation.	Netlify for frontend hosting, Firebase for backend services, GitHub Actions for CI/CD.	WebStorm
Progressive Web App E-commerce Platform	Next.js, TypeScript, Tailwind CSS, Framer Motion, Shopify API, Storybook, Jest, Cypress, Figma	Progressive web app architecture with responsive design and offline capabilities. Implements dynamic animations and transitions for enhanced user experience.	Powers mobile-first commerce experiences with product discovery, cart management, checkout, personalized recommendations using ML, and integration with multiple payment gateways.	Vercel for Next.js hosting, Cloudflare for CDN and edge functions, GitHub Actions for CI/CD.	Visual Studio Code
Accessibility-Focused Content Management System	React, TypeScript, Styled Components, Bulma, GraphQL, Jest, Axe-core, Figma, WebFlow	Design system focused on accessibility with ARIA implementation and keyboard navigation. Uses server components for improved initial load performance.	Manages web content with previews, publishing workflows, media management, SEO optimization, and ML-based content recommendations with strong focus on accessibility compliance.	DigitalOcean App Platform, Spaces for static assets, GitHub Actions for CI/CD, Terraform for infrastructure.	Visual Studio Code

## 10. Security (Metasploit, Kali Linux, Burp Suite, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Enterprise Security Orchestration Platform	Python, FastAPI, PostgreSQL, Redis, React, Docker, Celery, Hashicorp Vault, MITRE ATT&CK, Metasploit, Nmap, OWASP ZAP	Security automation architecture with event-driven workflows and fine-grained permission model. Implements secret management with Vault and integrates with multiple security tools.	Orchestrates security operations including vulnerability scanning, threat hunting, incident response, and compliance reporting with ML-based threat intelligence and anomaly detection.	AWS EKS for container orchestration, RDS for PostgreSQL, ElastiCache for Redis, S3 for artifact storage, CloudFront for frontend, CodePipeline for CI/CD, Terraform for infrastructure.	PyCharm Professional
Secure DevSecOps Pipeline Platform	Java, Spring Boot, PostgreSQL, Redis, Angular, Docker, Jenkins, SonarQube, OWASP Dependency-Check, Trivy, Prowler	Implements security-as-code with policy enforcement at multiple stages of the development lifecycle. Uses automated vulnerability scanning and compliance validation.	Integrates security into CI/CD pipelines with code scanning, dependency checking, container scanning, infrastructure compliance, and ML-based prioritization of security findings.	Google Cloud GKE, Cloud SQL for PostgreSQL, MemISTORY for Redis, Cloud Build for CI/CD integration, Terraform for infrastructure.	IntelliJ IDEA Ultimate
Zero Trust Network Access Control System	Go, PostgreSQL, Redis, React, Docker, OpenID Connect, OAuth 2.0, SAML, WebAuthn, YubiKey integration	Implements zero trust architecture with continuous authentication and authorization based on user, device, network, and behavior context. Uses policy-based access control.	Manages secure access to corporate resources with multi-factor authentication, device health validation, network segmentation, and ML-based behavioral analytics for anomaly detection.	Azure AKS for container orchestration, Azure Database for PostgreSQL, Azure Cache for Redis, Azure Key Vault for secrets, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio Code with Go extensions
Security Information and Event Management (SIEM)	Python, Elasticsearch, Kibana, Logstash, Kafka, FastAPI, React, Docker, Sigma rules engine, YARA, Wireshark	Distributed log processing architecture with Kafka for ingestion and Elasticsearch for storage and search. Implements correlation rules engine for threat detection.	Collects and analyzes security logs from multiple sources for threat detection, incident response, compliance reporting, and forensic investigation with ML-based anomaly detection algorithms.	AWS EKS for container orchestration, Amazon OpenSearch Service, MSK for Kafka, S3 for log archiving, CodePipeline for CI/CD, CloudFormation for infrastructure.	Visual Studio Code with Python extensions

## 11. DevOps (Jenkins, GitHub Actions, Docker, Kubernetes, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Enterprise GitOps Platform	Go, Kubernetes, Argo CD, Flux, Helm, Prometheus, Grafana, Elasticsearch, Kibana, React, Docker	GitOps architecture with declarative infrastructure and application configuration. Implements continuous delivery with automated progressive delivery patterns.	Manages application deployment across multiple Kubernetes clusters with promotion between environments, canary deployments, automated rollbacks, and ML-based deployment risk assessment.	Self-hosted Kubernetes with bare metal servers, Ansible for server provisioning, Terraform for infrastructure, Vault for secrets.	GoLand, Visual Studio Code
Multi-cloud Management Platform	Python, FastAPI, PostgreSQL, Redis, React, Docker, Terraform, Ansible, Packer, Kubernetes, Prometheus, Grafana	Multi-cloud orchestration architecture with abstraction layer for cloud-agnostic resource management. Implements policy-based governance and cost optimization.	Centralizes management of resources across AWS, Azure, and GCP with unified governance, compliance checking, cost optimization, and ML-based resource sizing recommendations.	AWS EKS for the platform itself, RDS for PostgreSQL, ElastiCache for Redis, S3 for artifact storage, CodePipeline for CI/CD, CDK for infrastructure.	PyCharm Professional
Test Orchestration Platform	Java, Spring Boot, PostgreSQL, Redis,	Test orchestration architecture with parallel test execution and	Automates testing processes including unit, integration, performance,	Azure AKS for container orchestration, Azure Database	

Continuous Testing and Quality Platform	Angular, Docker, Jenkins, Selenium, JMeter, SonarQube, Grafana	distributed test environments. Implements test data management and dynamic test environment provisioning.	and security testing with test environment management, test data generation, and ML-based test prioritization.	for PostgreSQL, Azure Cache for Redis, Azure DevOps for CI/CD, Terraform for infrastructure.	IntelliJ IDEA Ultimate	
Observability and Monitoring Platform	Go, ClickHouse, Prometheus, Grafana, OpenTelemetry, Jaeger, Loki, React, Docker, Kubernetes	Distributed tracing architecture with OpenTelemetry for instrumentation and high-performance time-series database for metrics. Implements log aggregation and correlation.	Provides end-to-end monitoring of applications and infrastructure with metrics, logs, traces, alerting, dashboards, and ML-based anomaly detection and root cause analysis.	Google Cloud GKE, Cloud SQL, Pub/Sub, Cloud Storage, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code with Go extensions	

## 12. C# (.NET 8, ASP.NET Core, Blazor, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Enterprise Resource Planning System	C# 12, .NET 8, ASP.NET Core, Blazor WASM, Entity Framework Core, SQL Server, Redis, SignalR, gRPC, xUnit, Playwright, Docker	Clean architecture with CQRS pattern and MediatR for command handling. Uses Blazor WebAssembly for rich client-side interactions with offline support.	Manages enterprise resources including human resources, finance, inventory, procurement, and project management with ML-powered forecasting and resource optimization.	Azure App Service for web components, Azure SQL Database, Azure Cache for Redis, Azure Blob Storage, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio 2022 Enterprise
Healthcare Management Platform	C# 12, .NET 8, ASP.NET Core, Blazor Server, Entity Framework Core, PostgreSQL, Redis, RabbitMQ, IdentityServer, xUnit, Quartz.NET, Docker	Vertical slice architecture with feature-based organization and minimal cross-cutting concerns. Implements real-time updates with Blazor Server and SignalR for live dashboards.	Manages healthcare operations including patient records, appointment scheduling, billing, inventory management, and staff scheduling with ML-based patient outcome prediction and resource optimization.	AWS Elastic Beanstalk for .NET applications, Aurora PostgreSQL, ElastiCache for Redis, Amazon MQ for RabbitMQ, CloudFront for assets, CodePipeline for CI/CD, Terraform for infrastructure.	Visual Studio 2022 Enterprise
Financial Trading Platform	C# 12, .NET 8, ASP.NET Core, Blazor WASM, Entity Framework Core, SQL Server, Redis, SignalR, gRPC, ML.NET, xUnit, Docker	Microservices architecture with API gateways and service discovery. Implements high-performance data processing with memory-mapped files and custom object pooling.	Executes financial trading operations including market data processing, order management, position keeping, risk calculation, and reporting with ML-based market prediction and anomaly detection.	Azure Kubernetes Service, Azure SQL Database, Azure Cache for Redis, Azure Service Bus, Azure API Management, Azure DevOps for CI/CD, Terraform for infrastructure.	Visual Studio 2022 Enterprise
Cross-platform Mobile Application Suite	C# 12, .NET MAUI, ASP.NET Core, SQLite, Azure Functions, Xamarin.Essentials, Prism, xUnit, App Center, ML.NET	Cross-platform application architecture with shared business logic and platform-specific UI implementations. Uses offline-first approach with local data synchronization.	Provides mobile applications for field workers including data collection, task management, navigation, offline operations, and ML-based data validation and image recognition.	Azure App Service for backend, Azure Functions for serverless components, Azure SQL Database, Azure Blob Storage, Azure DevOps for CI/CD, Azure Resource Manager templates for infrastructure.	Visual Studio 2022 Enterprise

## 13. Go (Goroutines, Channels, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Distributed Content Delivery Network	Go, Redis, PostgreSQL, Prometheus, Grafana, React, Docker, Kubernetes, Envoy, etcd, NATS	High-performance architecture with concurrent request handling using goroutines and channels. Implements circuit breaking and rate limiting with distributed coordination.	Distributes content globally with edge caching, dynamic content acceleration, image optimization, video streaming, and ML-based content prefetching based on user behavior.	AWS EKS for container orchestration, Aurora PostgreSQL, ElastiCache for Redis, CloudFront as origin for global traffic, Route 53 for DNS, CodePipeline for CI/CD, Terraform for infrastructure.	GoLand
Real-time Messaging Platform	Go, NATS, PostgreSQL, Redis, WebSockets, gRPC, React, Docker, Kubernetes, Prometheus, Jaeger	Event-driven architecture with message brokers for asynchronous communication. Uses goroutines for concurrent connection handling with backpressure mechanisms.	Powers real-time messaging applications including chat, notifications, activity feeds, and collaboration tools with ML-based content moderation and prioritization.	Google Cloud GKE, Cloud SQL for PostgreSQL, Memorystore for Redis, Cloud Pub/Sub for global messaging, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code with Go extensions
High-performance API Gateway	Go, etcd, Prometheus, Grafana, Envoy, Redis, React, Docker, Kubernetes, OpenTelemetry	API gateway architecture with dynamic routing and service discovery. Implements traffic management patterns including circuit breaking, retries, and rate limiting.	Routes API traffic with authentication, authorization, request validation, response transformation, and ML-based anomaly detection for API usage patterns.	DigitalOcean Kubernetes, managed PostgreSQL, Redis, Spaces for logs, GitHub Actions for CI/CD, Terraform for infrastructure.	Visual Studio Code with Go extensions
Cloud-native Database Service	Go, CockroachDB, etcd, Prometheus, Grafana, React, Docker, Kubernetes, gRPC, Raft consensus	Distributed database architecture with sharding and consensus protocols for strong consistency. Uses custom storage engine optimized for cloud environments.	Provides managed database service with automatic scaling, backups, failover, encryption, audit logging, and ML-based query optimization and performance recommendations.	AWS EKS for container orchestration, EBS for persistent storage, S3 for backups, Parameter Store for configuration, CodePipeline for CI/CD, CloudFormation for infrastructure.	GoLand

## 14. Rust (Cargo, Rustup, Crates.io, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
High-performance Data Processing Engine	Rust, Apache Arrow, PostgreSQL, Redis, React, WebAssembly, Docker, Kubernetes, Prometheus, Grafana	Zero-copy architecture with memory-safe parallel processing using Rust's ownership model. Implements custom memory allocators and SIMD optimizations for vector operations.	Processes large datasets for analytics applications with columnar data processing, complex aggregations, joins, and ML-based anomaly detection with minimal resource usage.	AWS EKS for container orchestration, Aurora PostgreSQL, ElastiCache for Redis, S3 for data lake, Lambda for serverless components, CodePipeline for CI/CD, Terraform for infrastructure.	CLion with Rust plugin, VS Code with rust-analyzer
WebAssembly-powered Edge Computing Platform	Rust, WebAssembly, Wasmtime, PostgreSQL, Redis, React, Docker, Kubernetes, gRPC, Envoy	WebAssembly-based architecture for portable, secure, and high-performance edge computing. Uses isolation boundaries with capability-based security model.	Executes code at the edge for content delivery networks, IoT gateways, and API proxies with ML inference at the edge for real-time decision making and data processing.	Cloudflare Workers for edge functions, KV for edge storage, Google Cloud GKE for control plane, Cloud SQL for PostgreSQL, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code with rust-analyzer
Secure Blockchain Platform	Rust, PostgreSQL, Redis, React, Docker, Kubernetes, libp2p, IPFS, WebAssembly	Blockchain architecture with Byzantine fault tolerance consensus and formal verification of critical components. Implements zero-knowledge proofs for privacy.	Powers decentralized applications including digital asset management, supply chain tracking, identity verification, and ML-based fraud detection in blockchain transactions.	Azure AKS for container orchestration, Azure Database for PostgreSQL, Azure Cache for Redis, Azure Key Vault for secrets, Azure DevOps for CI/CD, Bicep for infrastructure.	CLion with Rust plugin
Low-latency Network Security Appliance	Rust, eBPF, PostgreSQL, Redis, React, Docker, Kubernetes, DPDK, XDP	Kernel bypass architecture with direct packet processing using DPDK and XDP. Implements zero-copy packet inspection and stateful firewall with minimal latency.	Protects network infrastructure with traffic filtering, intrusion detection, DDoS mitigation, and ML-based threat detection with line-rate packet processing performance.	Bare metal servers with custom Linux kernel, Ansible for deployment, GitLab CI/CD, Terraform for infrastructure.	CLion with Rust plugin

## 15. PHP (Laravel, Symfony, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Enterprise Content Management System	PHP 8.2, Laravel, MySQL, Redis, Vue.js, Docker, RabbitMQ, Elasticsearch, AWS S3, PHPUnit	Domain-driven design architecture with modular monolith approach. Implements event sourcing for content versioning and audit trails.	Manages digital content for enterprises including document management, media asset management, workflow automation, and ML-powered content tagging and classification.	AWS Elastic Beanstalk for PHP applications, Aurora MySQL, ElastiCache for Redis, Amazon S3 for file storage, CodePipeline for CI/CD, Terraform for infrastructure.	PhpStorm
E-commerce Platform with Marketplace Support	PHP 8.2, Symfony, MySQL, Redis, React, Docker, RabbitMQ, Elasticsearch, Stripe API, PHPUnit	Hexagonal architecture with ports and adapters for external system integration. Implements CQRS pattern with separate read and write models for scaling.	Powers multi-vendor marketplace platforms with product catalog management, order processing, payment integration, vendor management, and ML-based product recommendations.	Google Cloud GKE for container orchestration, Cloud SQL for MySQL, Memorystore for Redis, Cloud Pub/Sub for messaging, Cloud Build for CI/CD, Terraform for infrastructure.	PhpStorm
Learning Management System	PHP 8.2, Laravel, PostgreSQL, Redis, Vue.js, Docker, WebSockets, MeliSearch, AWS S3, PHPUnit	Modular architecture with plug-in system for extensibility. Implements real-time collaboration with WebSockets and event broadcasting.	Delivers online learning experiences with course management, student progress tracking, assessment tools, discussion forums, and ML-based personalized learning paths.	Azure App Service for PHP applications, Azure Database for PostgreSQL, Azure Cache for Redis, Azure Blob Storage for files, Azure DevOps for CI/CD, Terraform for infrastructure.	Visual Studio Code with PHP extensions
Healthcare Patient Portal	PHP 8.2, Symfony, MySQL, Redis, React, Docker, RabbitMQ, Elasticsearch, Twilio API, PHPUnit	API-first architecture with versioned endpoints and comprehensive documentation. Implements FHIR standards for healthcare data interoperability.	Connects patients with healthcare providers for appointment scheduling, medical record access, secure messaging, prescription refills, and ML-powered symptom checking.	AWS EKS for container orchestration, Aurora MySQL, ElastiCache for Redis, Amazon MQ for RabbitMQ, S3 for document storage, CodePipeline for CI/CD, CloudFormation for infrastructure.	PhpStorm

## 16. Ruby (Rails, Sinatra, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Project Management Platform	Ruby 3.2, Rails 7, PostgreSQL, Redis, Sidekiq, React, Docker, Elasticsearch, AWS S3, RSpec, Capybara	Domain-driven design with bounded contexts and service objects for complex business logic. Implements background processing with Sidekiq for asynchronous tasks.	Manages project workflows including task management, team collaboration, time tracking, resource allocation, and ML-based project timeline predictions and risk assessment.	Heroku for application hosting, Heroku PostgreSQL, Heroku Redis, AWS S3 for file storage, GitHub Actions for CI/CD.	RubyMine
Customer Relationship Management System	Ruby 3.2, Rails 7, MySQL, Redis, Sidekiq, Vue.js, Docker, Elasticsearch, Twilio API, RSpec, Capybara	Event-driven architecture with domain events for integration between bounded contexts. Uses Action Cable for real-time updates and notifications.	Manages customer interactions including contact management, sales pipeline, email campaigns, customer support tickets, and ML-based lead scoring and customer segmentation.	AWS EKS for container orchestration, Aurora MySQL, ElastiCache for Redis, SES for email delivery, S3 for file storage, CodePipeline for CI/CD, CDK for infrastructure.	Visual Studio Code with Ruby extensions
E-commerce Order Management System	Ruby 3.2, Sinatra, PostgreSQL, Redis, Sidekiq, React, Docker, Elasticsearch, Stripe API, RSpec	Microservices architecture with lightweight Sinatra applications for specific bounded contexts. Implements event-driven integration with message queues.	Processes e-commerce orders including inventory management, payment processing, fulfillment, shipping, returns, and ML-based fraud detection for transactions.	Google Cloud GKE, Cloud SQL for PostgreSQL, Memorystore for Redis, Pub/Sub for messaging, Cloud Build for CI/CD, Terraform for infrastructure.	RubyMine
Fintech Accounting Platform	Ruby 3.2, Rails 7, PostgreSQL, Redis, Sidekiq, React, Docker, Elasticsearch, Plaid API, RSpec, Capybara	Service-oriented architecture with Rails engines for modular components. Implements double-entry bookkeeping with ACID transactions for financial integrity.	Manages financial accounting for businesses including general ledger, accounts receivable/payable, financial reporting, tax calculations, and ML-based expense categorization and fraud detection.	Azure AKS for container orchestration, Azure Database for PostgreSQL, Azure Cache for Redis, Azure Blob Storage, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio Code with Ruby extensions

## 17. C++ (STL, Boost Libraries, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
High-frequency Trading System	C++ 20, Boost, CUDA, FlatBuffers, ZeroMQ, Linux kernel tuning, Python (for ML), React (for dashboard), InfluxDB, Grafana	Ultra-low latency architecture with lock-free data structures and custom memory allocators. Uses NUMA-aware thread placement and kernel bypass networking with DPDK.	Executes trading strategies with nanosecond precision including order book management, market data processing, smart order routing, and ML-based signal generation with risk management.	Bare metal servers with proximity to exchanges, custom Linux distribution, Ansible for deployment, Jenkins for CI/CD.	CLion, Visual Studio
Real-time 3D Rendering Engine	C++ 20+, Vulkan, GLSL, DirectX, OpenGL, CMake, Python (for scripting), Qt (for tools), Boost, SIMD, TBB	Data-oriented design with entity-component-system architecture for cache-friendly memory layout. Implements multi-threaded rendering pipeline with job system.	Powers 3D applications including game development, architectural visualization, medical imaging, and ML-based procedural content generation and physics simulation.	Custom installer package for desktop applications, Docker containers for server components, GitHub Actions for CI/CD.	Visual Studio, CLion
Video Processing and	C++ 20+, FFmpeg, OpenCV, Boost, CUDA, CMake, WebRTC, React (for frontend), PostreSQL	Pipeline-based architecture with zero-copy processing and hardware acceleration. Implements adaptive bitrate streaming.	Processes and delivers video content including transcoding, content analysis, live streaming, and ML-based object recognition and content processing.	AWS EKS for container orchestration, EC2 GPU Instances for processing, S3 for storage, CloudFront for delivery.	Visual Studio

Streaming Platform	Redis, Docker	with client-side quality selection.	moderation.	CodePipeline for CI/CD, Terraform for infrastructure.	CLion
Autonomous Vehicle Simulation Platform	C+++20, Unreal Engine, CUDA, OpenCV, ROS 2, CMake, Python (for ML), React (for dashboard), PostgreSQL, Docker	Component-based architecture with publish-subscribe messaging for sensor data. Implements physics-based simulation with realistic sensor models.	Simulates autonomous vehicle behavior including sensor simulation, traffic scenarios, environmental conditions, and ML-based perception, prediction, and planning algorithms.	Google Cloud GKE with GPU nodes, Cloud SQL for PostgreSQL, Filestore for shared data, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio, CLion

## 18. C (GCC, Clang/LLVM, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Embedded IoT Operating System	C11, ARM architecture, RTOS, LLVM, GCC, GDB, CMake, MQTT, CoAP, Rust (for selected components), Python (for tooling)	Real-time operating system architecture with deterministic scheduling and minimal memory footprint. Implements secure boot and over-the-air update capabilities.	Powers IoT devices with networking, security, power management, sensor integration, and ML-based edge analytics for industrial automation, smart buildings, and connected devices.	Custom firmware deployment system, OTA update service on AWS IoT Core, CodeBuild for CI/CD, Terraform for infrastructure.	Visual Studio Code with C/C++ extensions, Eclipse CDT
High-performance Network Security Appliance	C11, DPDK, eBPF, Netfilter, OpenSSL, GCC, Valgrind, CMake, Python (for management), React (for dashboard)	Kernel bypass architecture with zero-copy packet processing using DPDK. Implements stateful packet inspection and pattern matching with hardware acceleration.	Protects network infrastructure with firewall, intrusion detection/prevention, DDoS mitigation, VPN termination, and ML-based traffic analysis for threat detection.	Bare metal servers, custom Linux distribution, Ansible for deployment, GitLab CI/CD, Packer for image building.	Vim/Emacs with C plugins, Visual Studio Code
Embedded Medical Device Firmware	C11, ARM Cortex-M, FreeRTOS, GCC, GDB, CMake, MISRA C, Python (for testing), Qt (for companion app)	Safety-critical firmware architecture with formal verification and static analysis. Implements redundancy and fail-safe mechanisms for medical-grade reliability.	Controls medical devices for patient monitoring, drug delivery, diagnostic imaging, and ML-based signal processing for real-time health analytics with regulatory compliance (FDA, CE).	Custom deployment system with validation and verification, secure manufacturing process, GitLab CI/CD for firmware builds.	IAR Embedded Workbench, Visual Studio Code
Database Storage Engine	C11-B-tree, LSM tree, Memory-mapped files, SIMD, GCC, Valgrind, CMake, Python (for tooling), React (for dashboard)	Storage engine architecture with pluggable storage formats and transactional semantics. Implements ACID properties with write-ahead logging and MVCC.	Provides high-performance data storage for database systems with indexing, compression, encryption, transaction processing, and ML-based query optimization and auto-tuning.	Containerized deployment with Docker, Kubernetes for orchestration, Ansible for configuration, Jenkins for CI/CD, Terraform for infrastructure.	Visual Studio Code with C/C++ extensions, CLion

## 19. Flutter (Dart, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Cross-platform Telemedicine Application	Flutter, Dart, Firebase (Firestore, Auth, Functions, Storage), GetX, WebRTC, Stripe, TensorFlow Lite, Node.js (backend)	Cross-platform architecture with shared business logic and unified UI across platforms. Implements video conferencing with WebRTC and HIPAA-compliant data storage.	Connects patients with healthcare providers for virtual consultations, appointment scheduling, medical record access, prescription management, and ML-based symptom assessment and triage.	Google Play Store and Apple App Store for mobile apps, Firebase for backend services, Cloud Functions for serverless logic, GitHub Actions for CI/CD.	Android Studio with Flutter plugin
Enterprise Field Service Management	Flutter, Dart, GraphQL, REST, SQLite, Hive, Bloc pattern, Firebase, ML Kit, .NET Core (backend), PostgreSQL	Offline-first architecture with local data storage and synchronization. Implements location-based services and background processing for field operations.	Manages field service operations including work order management, scheduling, inventory control, customer signature capture, and ML-powered predictive maintenance with barcode/QR scanning.	AWS Amplify for backend services, AppCenter for distribution and testing, CodeBuild for CI/CD, Terraform for infrastructure.	Visual Studio Code with Flutter extensions
FinTech Mobile Banking Platform	Flutter, Dart, REST, gRPC, SQLite, Bloc pattern, Firebase, Plaid API, Stripe, Node.js (backend), MongoDB	Secure architecture with biometric authentication and encrypted local storage. Implements reactive UI with streams for real-time updates and notifications.	Provides mobile banking services including account management, funds transfer, bill payment, budgeting tools, and ML-based fraud detection and spending categorization.	Google Play Store and Apple App Store for mobile apps, AWS EKS for backend services, DynamoDB, Lambda for serverless functions, CodePipeline for CI/CD, CDK for infrastructure.	Android Studio with Flutter plugin
Retail Inventory Management System	Flutter, Dart, REST, GraphQL, SQLite, Provider, Firebase, ML Kit, Spring Boot (backend), PostgreSQL	Multi-modal architecture with support for handheld scanners and mobile devices. Implements barcode/QR scanning and image recognition for product identification.	Manages retail inventory operations including stock counting, receiving, transfers, order fulfillment, and ML-based inventory forecasting and optimization with real-time synchronization across stores.	Azure App Service for backend, Azure SQL Database, Azure Blob Storage, App Center for distribution, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio Code with Flutter extensions

## 20. Game Development (Unity, Unreal Engine, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Multiplayer Game Platform with Matchmaking	Unity, C#, Node.js, MongoDB, Redis, Photon Networking, AWS GameLift, ML.NET, PlayFab	Client-server architecture with authoritative server for game state management. Implements entity component system for game object management.	Creates multiplayer game experiences with matchmaking, leaderboards, in-game purchases, social features, and ML-based player skill ranking and cheat detection.	AWS GameLift for game servers, EC2 for backend services, DynamoDB for data storage, CloudFront for content delivery, CodePipeline for CI/CD, CDK for infrastructure.	Unity Editor, Visual Studio
Virtual Reality Training Simulation	Unreal Engine, C++, Python (for ML), PostgreSQL, React (for web portal), AWS, Oculus SDK, OpenXR	Immersive VR architecture with physics-based interactions and realistic rendering. Implements networked multi-user experiences with voice communication.	Delivers immersive training simulations for industries including healthcare, manufacturing, and emergency services with ML-based performance assessment and adaptive difficulty.	AWS EC2 for backend services, S3 for content delivery, RDS for PostgreSQL, Oculus Store and Steam for distribution, Jenkins for CI/CD, Terraform for infrastructure.	Unreal Editor, Visual Studio
Mobile Augmented Reality Education Platform	Unity, C#, ARCore, ARKit, Firebase, Node.js, MongoDB, ML.NET, React (for web portal)	Cross-platform AR architecture with shared AR experiences between devices. Implements computer vision for object recognition and tracking.	Creates educational AR experiences with interactive 3D models, guided learning paths, collaborative activities, and ML-based student performance analysis and content recommendations.	Google Play Store and Apple App Store for mobile apps, Google Cloud Run for backend services, Firestore for data storage, Cloud Build for CI/CD.	Unity Editor, Visual Studio
Serious Game for Healthcare Rehabilitation	Godot Engine, GDScript, C#, Python (for ML), PostgreSQL, React (for therapist dashboard), Azure Kinect	Motion tracking architecture with skeletal analysis and gesture recognition. Implements game mechanics designed for therapeutic exercises.	Provides gamified rehabilitation exercises for physical therapy patients with progress tracking, therapist dashboard, custom exercise programs, and ML-based movement analysis and feedback.	Digital distribution platforms for PC/console, Azure App Service for backend, Azure Database for PostgreSQL, Azure Blob Storage, Azure DevOps for CI/CD.	Godot Editor, Visual Studio Code

## 21. Video Processing (ffmpeg, opencv, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
AI-powered Video Surveillance Platform	Python, OpenCV, FFmpeg, TensorFlow, PyTorch, FastAPI, PostgreSQL, Redis, React, Docker, Kubernetes	Distributed video processing architecture with pipeline stages for detection, tracking, and analysis. Implements hardware acceleration with GPU and FPGA for real-time processing.	Monitors video feeds for security applications including object detection, person identification, behavior analysis, and ML-based anomaly detection with alert generation and forensic search capabilities.	AWS EKS with GPU nodes, S3 for video storage, RDS for PostgreSQL, ElastiCache for Redis, SageMaker for model training, CodePipeline for CI/CD, Terraform for infrastructure.	PyCharm Professional
Media Content Analysis Platform	C++, Python, FFmpeg, OpenCV, CUDA, TensorFlow, FastAPI, MongoDB, Redis, React, Docker	Parallel processing architecture with adaptive resource allocation based on video complexity. Implements content-aware encoding for optimal quality/bitrate ratio.	Analyzes media content for content platforms including scene detection, content classification, inappropriate content filtering, and ML-based video summarization and highlight extraction.	Google Cloud GKE with GPU nodes, Cloud Storage, Cloud SQL for PostgreSQL, Memorystore for Redis, AI Platform for model training, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio for C++, PyCharm for Python
Automated Video Production System	Python, FFmpeg, OpenCV, PyTorch, Node.js, PostgreSQL, Redis, React, Docker, Kubernetes	Event-driven architecture with microservices for different video processing stages. Implements content-aware composition and editing based on visual elements.	Automates video production workflows including raw footage processing, editing, color grading, graphics overlay, and ML-based content curation and highlight selection.	Azure AKS with GPU nodes, Azure Blob Storage, Azure Database for PostgreSQL, Azure Cache for Redis, Azure ML for model training, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio Code with Python extensions
Interactive Live Streaming Platform	Rust, C++, WebRTC, FFmpeg, OpenCV, Python (for ML), Node.js, MongoDB, Redis, React, Docker	Low-latency streaming architecture with adaptive bitrate and minimal buffering. Implements real-time video effects processing during live streaming.	Powers interactive live streaming applications with real-time audience engagement, virtual backgrounds, augmented reality effects, and ML-based content moderation and viewer analytics.	AWS EKS, MediaLive for streaming, S3 for storage, DynamoDB, ElastiCache for Redis, CodePipeline for CI/CD, CloudFormation for infrastructure.	CLion for C++/Rust, Visual Studio Code for JavaScript

## 22. Compilers (LLVM, JIT/AOT techniques, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Domain-Specific Language for Financial Modeling	C++, LLVM, ANTLR, Python, React, Docker, PostgreSQL, Redis	Custom language compilation pipeline with domain-specific optimizations for financial calculations. Implements JIT compilation for interactive use and AOT for production deployment.	Creates a specialized programming language for financial analysts to model complex financial instruments, risk scenarios, and regulatory calculations with ML-based code optimization and performance tuning.	AWS EKS for container orchestration, EC2 for compilation services, Lambda for serverless functions, S3 for artifact storage, CodePipeline for CI/CD, CDK for infrastructure.	CLion, Visual Studio Code
WebAssembly Runtime for Edge Computing	Rust, WebAssembly, LLVM, C++, JavaScript, React, Docker, PostgreSQL	Secure sandbox execution environment for WebAssembly modules with capability-based security model. Implements ahead-of-time compilation for optimal performance.	Executes code safely at the edge for content delivery networks, IoT applications, and serverless platforms with ML models compiled to WebAssembly for efficient inference at the edge.	Cloudflare Workers for edge deployment, Google Cloud GKE for management plane, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code with Rust extensions
Query Compiler and Optimizer for Big Data	C++, Java, LLVM, ANTLR, Apache Arrow, React, Docker, PostgreSQL	Query compilation pipeline with cost-based optimizer and code generation. Implements vectorized execution for data processing operations with SIMD acceleration.	Optimizes and executes analytical queries across large datasets with intelligent query planning, predicate pushdown, and ML-based query optimization and resource allocation.	AWS EMR for Hadoop ecosystem, EKS for container services, S3 for data lake, Lambda for serverless functions, CodePipeline for CI/CD, Terraform for infrastructure.	CLion, IntelliJ IDEA
Mobile Application Performance Optimizer	C++, LLVM, Swift, Kotlin, Java, Python, React, Docker, PostgreSQL	Binary optimization pipeline with profile-guided optimization and code layout improvements. Implements platform-specific code generation for iOS and Android.	Improves mobile application performance through binary optimization, dead code elimination, and ML-based performance profiling and bottleneck identification for iOS and Android applications.	Azure DevOps for CI/CD pipeline, Azure Kubernetes Service for optimization services, Azure Storage for artifacts, Bicep for infrastructure.	Visual Studio, Xcode

## 23. Big Data + ETL (Spark, Kafka, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Real-time Data Processing Platform	Scala, Apache Spark, Kafka, Flink, Airflow, Kubernetes, Prometheus, Grafana, PostgreSQL, React, Docker	Stream processing architecture with exactly-once semantics and windowed operations. Implements change data capture for database synchronization and event sourcing.	Processes real-time data streams for business intelligence including clickstream analysis, IoT sensor data, financial transactions, and ML-based anomaly detection and predictive maintenance.	AWS EMR for Spark, MSK for Kafka, S3 for data lake, Redshift for data warehousing, Lambda for serverless functions, Step Functions for orchestration, CodePipeline for CI/CD, Terraform for infrastructure.	IntelliJ IDEA with Scala plugin
Enterprise Data Integration Platform	Python, Airflow, dbt, Snowflake, BigQuery, Spark, Kafka, Terraform, React, Docker, Kubernetes	Data mesh architecture with decentralized ownership and self-service capabilities. Implements data contracts and quality monitoring for data products.	Integrates data from multiple enterprise systems including CRM, ERP, marketing platforms, and operational databases for analytics, reporting, and ML-based customer insights and business forecasting.	GCP Dataproc for Spark, Pub/Sub for messaging, BigQuery for data warehousing, Cloud Composer for Airflow, Cloud Build for CI/CD, Terraform for infrastructure.	PyCharm Professional, dbt Cloud
Streaming Platform	Java, Kafka Streams, ksqlDB, Kafka Connect, Elasticsearch, Kibana, React	Event streaming architecture with stream processing for real-time analysis, transformations, and joins.	Analyzes streaming data from IoT devices for industrial applications including equipment monitoring, predictive maintenance, and operational efficiency.	Azure HDInsight for Hadoop ecosystem, Event Hubs for messaging, Azure Data Lake for storage, Azure Stream Analytics for processing, Azure Functions for real-time processing, Azure Data Factory for orchestrating data flows.	IntelliJ IDEA Ultimate

<b>Analytics Platform for IoT</b>	Apache Flink, Apache Beam, Kafka, Redis, Docker, Kubernetes, TensorFlow	Real-time analytics architecture for edge-to-cloud processing guarantees and scalable storage.	including equipment monitoring, predictive maintenance, energy optimization, and ML-based anomaly detection with alerting.	Apache Data Lake for storage, Databricks for processing, Azure DevOps for CI/CD, Bicep for infrastructure.	IntelliJ IDEA Ultimate
<b>Data Quality and Governance Platform</b>	Python, Great Expectations, Apache Atlas, Airflow, Spark, Kafka, PostgreSQL, React, Docker, Kubernetes	Metadata-driven architecture with automated data quality validation and lineage tracking. Implements policy enforcement for data governance and compliance.	Ensures data quality and governance across the enterprise data landscape with profiling, validation, lineage tracking, and ML-based data quality prediction and anomaly detection.	AWS EMR for Spark, MSK for Kafka, S3 for data lake, RDS for PostgreSQL, Lambda for serverless functions, CodePipeline for CI/CD, CDK for infrastructure.	Visual Studio Code with Python extensions

## 24. Blockchain (Solidity, Web3.js, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Decentralized Finance Platform	Solidity, Rust, TypeScript, React, Ether.js, Hardhat, OpenZeppelin, IPFS, PostgreSQL, Redis, Docker	Smart contract architecture with formal verification and security auditing. Implements layer-2 scaling solutions and cross-chain interoperability.	Provides DeFi services including decentralized exchanges, lending/borrowing, yield farming, staking, and ML-based risk assessment and fraud detection for blockchain transactions.	Ethereum mainnet and layer-2 solutions for contracts, AWS EKS for backend services, RDS for PostgreSQL, ElastiCache for Redis, CloudFront for frontend, CodePipeline for CI/CD, Terraform for infrastructure.	Visual Studio Code with Solidity extensions
Supply Chain Traceability Blockchain	Hyperledger Fabric, Go, Node.js, React, PostgreSQL, Redis, Docker, Kubernetes, IPFS, TensorFlow	Permissioned blockchain architecture with private data collections and endorsement policies. Implements decentralized identity and verifiable credentials.	Tracks products through supply chain with immutable record of custody, compliance verification, counterfeit detection, and ML-based risk assessment and fraud detection for supply chain events.	Azure Blockchain Service for blockchain nodes, AKS for container orchestration, Azure Database for PostgreSQL, Azure Cache for Redis, Azure DevOps for CI/CD, Terraform for infrastructure.	Visual Studio Code with Go extensions
Tokenized Real Estate Investment Platform	Ethereum, Solidity, TypeScript, React, Web3.js, Truffle, Ganache, IPFS, PostgreSQL, Redis, Docker	Smart contract system with regulatory compliance features and automated dividend distribution. Implements fractional ownership and secondary market trading.	Enables fractional investment in real estate properties through tokenization, including property acquisition, investor management, dividend distribution, and ML-based property valuation and investment recommendations.	Ethereum mainnet for contracts, Google Cloud GKE for backend services, Cloud SQL for PostgreSQL, MemISTORY for Redis, Cloud Build for CI/CD, Terraform for infrastructure.	Visual Studio Code with Solidity extensions
Decentralized Identity Management System	Ethereum, Solidity, Rust, TypeScript, React, Web3.js, Hardhat, IPFS, PostgreSQL, Docker	Self-sovereign identity architecture with verifiable credentials and zero-knowledge proofs for privacy. Implements decentralized identifiers (DIDs) standard.	Manages digital identity verification for individuals and organizations with credential issuance, verification, selective disclosure, and ML-based risk scoring and fraud detection.	Multiple blockchain networks (Ethereum, Polygon), AWS EKS for backend services, Aurora PostgreSQL, CloudFront for frontend, CodePipeline for CI/CD, CloudFormation for infrastructure.	Visual Studio Code with Solidity extensions

## 25. GIS (ArcGIS, QGIS, PostGIS, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Smart City Urban Planning Platform	Python, Django, PostgreSQL/PostGIS, GeoServer, React, Leaflet, Docker, Kubernetes, Redis, Celery, TensorFlow	Geospatial data management architecture with spatial indexing and distributed processing for large datasets. Implements 3D visualization and simulation capabilities.	Supports urban planning processes including land use analysis, transportation planning, infrastructure management, environmental impact assessment, and ML-based urban growth prediction and optimization.	AWS EKS for container orchestration, RDS for PostgreSQL with PostGIS, ElastiCache for Redis, S3 for geospatial data storage, SageMaker for ML models, CodePipeline for CI/CD, Terraform for infrastructure.	PyCharm Professional
Precision Agriculture Management System	Java, Spring Boot, PostgreSQL/PostGIS, GeoServer, React, OpenLayers, Docker, Kubernetes, Redis, RabbitMQ, TensorFlow	Spatial data processing architecture with support for satellite imagery, drone data, and IoT sensor integration. Implements offline mobile support for field operations.	Manages agricultural operations including crop monitoring, field mapping, irrigation management, yield prediction, and ML-based pest detection and crop health analysis using multispectral imagery.	Google Cloud GKE, Cloud SQL for PostgreSQL with PostGIS, MemISTORY for Redis, Cloud Storage for geospatial data, AI Platform for ML models, Cloud Build for CI/CD, Terraform for infrastructure.	IntelliJ IDEA Ultimate
Logistics and Fleet Management Platform	Node.js, Express, PostgreSQL/PostGIS, MongoDB, React, Mapbox GL, Docker, Kubernetes, Redis, Kafka	Real-time location tracking architecture with geofencing and route optimization. Implements traffic-aware routing and predictive ETA calculations.	Optimizes logistics operations including fleet tracking, route planning, delivery management, driver assignment, and ML-based demand forecasting and delivery time prediction.	Azure AKS, Azure Database for PostgreSQL with PostGIS, Azure Cosmos DB, Azure Cache for Redis, Event Hubs, Azure Blob Storage, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio Code with JavaScript extensions
Emergency Response Management System	Python, FastAPI, PostgreSQL/PostGIS, Redis, React, Cesium, Docker, Kubernetes, Kafka, TensorFlow	Real-time geospatial event processing architecture with 3D visualization and simulation. Implements multi-agency coordination and resource allocation.	Coordinates emergency response operations including incident mapping, resource tracking, evacuation planning, risk assessment, and ML-based disaster impact prediction and resource optimization.	AWS EKS, Aurora PostgreSQL with PostGIS, ElastiCache for Redis, MSK for Kafka, S3 for geospatial data, Lambda for serverless functions, CodePipeline for CI/CD, CDK for infrastructure.	Visual Studio Code with Python extensions

## 26. Finance (Loan Origination, Credit Scoring, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Integrated Banking Platform	Java, Spring Boot, PostgreSQL, Redis, Kafka, React, Docker, Kubernetes, Elasticsearch, Kibana, TensorFlow, XGBoost	Microservices architecture with event sourcing and CQRS for scalable transaction processing. Implements distributed transaction management with saga pattern.	Provides core banking functions including account management, payments, loans, deposits, regulatory compliance, and ML-based fraud detection and credit scoring with real-time decision making.	AWS EKS for container orchestration, Aurora PostgreSQL, ElastiCache for Redis, MSK for Kafka, OpenSearch Service, SageMaker for ML models, CodePipeline for CI/CD, Terraform for infrastructure.	IntelliJ IDEA Ultimate
Investment Portfolio Management System	Python, FastAPI, PostgreSQL, Redis, React, Docker, Kubernetes, Pandas, NumPy, PyTorch, Scikit-learn	Event-driven architecture with real-time market data integration and portfolio valuation. Implements risk modeling and performance attribution analysis.	Manages investment portfolios for wealth management including asset allocation, rebalancing, order management, performance reporting, and ML-based portfolio optimization and risk assessment.	Google Cloud GKE, Cloud SQL for PostgreSQL, MemISTORY for Redis, Pub/Sub for market data, BigQuery for analytics, AI Platform for ML models, Cloud Build for CI/CD, Terraform for infrastructure.	PyCharm Professional
Algorithmic Trading Platform	C++, Python, PostgreSQL, Redis, Kafka, React, Docker, Kubernetes, TensorFlow, PyTorch, Pandas	High-performance trading architecture with ultra-low latency market data processing and order execution. Implements backtesting framework and strategy optimization.	Executes trading strategies automatically based on market data analysis, technical indicators, statistical arbitrage, and ML-based price prediction with risk management and regulatory compliance.	AWS EKS with custom EC2 instances for low-latency components, Aurora PostgreSQL, ElastiCache for Redis, MSK for Kafka, S3 for market data, CloudPipeline for CI/CD, CDK for infrastructure.	CLion for C++, PyCharm for Python
Insurance Claims Processing Platform	C#, ASP.NET Core, SQL Server, Redis, RabbitMQ, React, Docker, Kubernetes, ML.NET	Workflow-based architecture with business process management and document processing pipeline. Implements rules engine for policy-based decisions.	Processes insurance claims from submission to settlement including claim registration, verification, fraud detection, adjudication, payment processing, and ML-based claim triage and fraud detection.	Azure AKS for container orchestration, Azure SQL Database, Azure Cache for Redis, Service Bus for messaging, Cognitive Services for document processing, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio 2022 Enterprise

## 27. Assembly (x86, ARM, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
High-performance Cryptographic Library	Assembly (x86_64, ARM), C, Rust, CMake, Python (for testing), Docker, GitHub Actions	Optimized assembly implementations of cryptographic primitives leveraging SIMD instructions and hardware acceleration. Implements constant-time operations for side-channel resistance.	Provides cryptographic functions for security applications including encryption, hashing, digital signatures, and ML-accelerated homomorphic encryption with performance critical paths in assembly.	Package distribution through package managers, container images for deployment in Kubernetes, GitHub Actions for CI/CD.	Visual Studio Code with Assembly extensions, Vim
Real-time Signal Processing System	Assembly (x86_64, ARM), C, C++, CUDA, Python, CMake, Docker, Kubernetes	Signal processing architecture with assembly optimizations for performance-critical DSP operations. Implements vectorized operations with AVX/NEON instructions.	Processes audio and radio signals in real-time for telecommunications, broadcasting, scientific research, and ML-based signal classification and denoising with hardware acceleration.	Bare metal deployment for edge devices, AWS EKS for cloud components, ECR for container registry, CodeBuild for CI/CD, Terraform for infrastructure.	Visual Studio Code with Assembly extensions, Vim
Custom Virtual Machine for Edge Computing	Assembly (x86_64, ARM), C, Rust, WebAssembly, CMake, Docker, Kubernetes	Lightweight VM architecture with JIT compilation and sandbox security model. Implements custom instruction set optimized for IoT and edge use cases.	Executes code securely on edge devices for IoT applications, content delivery, and ML inference with minimal resource usage and hardware-specific optimizations.	Custom deployment system for edge devices, Azure IoT Edge for device management, Azure DevOps for CI/CD, Terraform for infrastructure.	Visual Studio Code with Assembly extensions, Vim
Performance-critical Database Components	Assembly (x86_64), C, C++, Python (for testing), Docker, Kubernetes	Low-level database engine components with assembly optimizations for critical paths. Implements custom memory management and SIMD-accelerated operations.	Enhances database performance for transaction processing, analytical queries, and ML-based query optimization with assembly-optimized sort, join, and aggregation operations.	Packaging as extension modules for PostgreSQL/MySQL, AWS EKS for container deployment, CodePipeline for CI/CD, Terraform for infrastructure.	Visual Studio Code with Assembly extensions, Vim

## 28. Medicine (FHIR, DICOM, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Integrated Electronic Health Record System	Java, Spring Boot, PostgreSQL, Redis, Kafka, React, Docker, Kubernetes, FHIR, SMART on FHIR, TensorFlow	Modular EHR architecture with FHIR-based interoperability and event-driven integration. Implements comprehensive audit logging and privacy controls for regulatory compliance.	Manages patient health records including clinical documentation, order management, medication administration, care planning, and ML-based clinical decision support and predictive analytics.	AWS EKS for container orchestration, Aurora PostgreSQL, ElastiCache for Redis, MSK for Kafka, S3 for document storage, SageMaker for ML models, CodePipeline for CI/CD, Terraform for infrastructure.	IntelliJ IDEA Ultimate
Medical Imaging Management Platform	Python, FastAPI, PostgreSQL, Redis, React, Docker, Kubernetes, DICOM, Orthanc, PyTorch, OpenCV	Medical imaging architecture with DICOM-compliant storage and retrieval. Implements image processing pipeline for enhancement and analysis.	Stores, manages, and analyzes medical images including radiology, cardiology, pathology, and ML-based diagnostic assistance and disease detection from medical images.	Google Cloud Healthcare API for DICOM, GKE for container orchestration, Cloud SQL for PostgreSQL, MemISTORY for Redis, Cloud Storage for images, AI Platform for ML models, Cloud Build for CI/CD, Terraform for infrastructure.	PyCharm Professional
Clinical Trial Management System	C#, ASP.NET Core, SQL Server, Redis, RabbitMQ, React, Docker, Kubernetes, FHIR, HL7	Workflow-based architecture with business process management for clinical trial protocols. Implements electronic data capture with validation rules.	Manages clinical trials including protocol design, patient recruitment, data collection, adverse event reporting, and ML-based patient matching and outcome prediction.	Azure App Service for web applications, Azure SQL Database, Azure Cache for Redis, Service Bus for messaging, Azure Blob Storage, Azure DevOps for CI/CD, Bicep for infrastructure.	Visual Studio 2022 Enterprise
Precision Medicine and Genomics Platform	Python, FastAPI, PostgreSQL, Redis, Kafka, React, Docker, Kubernetes, AlphaFold, PyTorch, Pandas	Scalable genomic data processing architecture with parallel computation and specialized storage formats. Implements privacy-preserving computation for sensitive genetic data.	Analyzes genomic data for precision medicine including variant calling, genotype-phenotype associations, pharmacogenomics, and ML-based disease risk prediction and treatment optimization.	AWS EKS with GPU nodes for compute-intensive tasks, Aurora PostgreSQL, ElastiCache for Redis, MSK for Kafka, S3 for genomic data, SageMaker for ML models, CodePipeline for CI/CD, CDK for infrastructure.	Visual Studio Code with Python extensions

## 29. Kotlin (Android SDK, Jetpack Compose, etc.)

Project	Tech Stack	Description	Business Logic	Deployment	IDE
Multi-platform Mobile Application Framework	Kotlin, Kotlin Multiplatform, Jetpack Compose, SwiftUI, Ktor, SQLDelight, Koin, Coroutines, Fireba...TensorFlow Lite	Cross-platform architecture with shared business logic and platform-specific UI implementations. Implements reactive UI with unidirectional data flow.	Creates mobile applications for both Android and iOS with shared core functionality, offline support, push notifications, and ML-based content personalization and image recognition.	Google Play Store and Apple App Store for mobile apps, Firebase for backend services, Google Cloud Run for additional backend services, Cloud Build for CI/CD	IntelliJ IDEA with Android Studio

System Name	Technology Stack	Architecture Description	Operations & Tools	IDE	
Enterprise Mobile Workforce Management	Kotlin, Android Jetpack, Jetpack Compose, Retrofit, Room, Coroutines, Dagger Hilt, Firebase, Spring Boot (backend), PostgreSQL, TensorFlow Lite	Clean architecture with domain-driven design and use case pattern. Implements offline-first approach with conflict resolution for data synchronization.	Manages mobile workforce operations including task assignment, time tracking, location-based services, forms data collection, and ML-based route optimization and work prioritization.	Google Play Store for Android app, AWS EKS for backend services, Aurora PostgreSQL, S3 for file storage, SQS for messaging, CodePipeline for CI/CD, Terraform for infrastructure.	Android Studio
Healthcare Patient Monitoring System	Kotlin, Android Jetpack, Jetpack Compose, Bluetooth LE, Room, WorkManager, Coroutines, Koin, Spring Boot (backend), PostgreSQL, TensorFlow Lite	Health monitoring architecture with background services for continuous data collection. Implements Bluetooth connectivity with medical devices and wearables.	Monitors patient health remotely through mobile devices and connected medical sensors, tracking vital signs, medication adherence, activity levels, and ML-based health status prediction and anomaly detection.	Google Play Store for Android app, Google Cloud GKE for backend services, Cloud SQL for PostgreSQL, Pub/Sub for real-time data, Healthcare API for FHIR integration, Cloud Build for CI/CD, Terraform for infrastructure.	Android Studio
Retail Point-of-Sale and Inventory System	Kotlin, Android Jetpack, Jetpack Compose, Room, Retrofit, WorkManager, Coroutines, Dagger Hilt, Node.js (backend), MongoDB, TensorFlow Lite	Point-of-sale architecture with offline capabilities and peripheral device integration. Implements hardware integration with barcode scanners, receipt printers, and payment terminals.	Manages retail operations including sales transactions, inventory management, customer management, reporting, and ML-based inventory forecasting and customer behavior analysis.	Google Play Store for Android app, custom distribution for enterprise devices, Azure AKS for backend services, Cosmos DB for MongoDB API, Azure DevOps for CI/CD, Bicep for infrastructure.	Android Studio