Clients – Generative AI

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Manufacturing
asianpaints

Retail/ CPG
AMERICANA
Starbucks
IFFCO — INVESTING IN THE FUTURE

FSI
ADSS
DUBAI HOLDING
3 DIGIT COMPANY
ADITYA BIRLA CAPITAL
TATA CAPITAL
CROSSTREE
UNITED ARAB EMIRATES MINISTRY OF FINANCE
Birla Sun Life Insurance

Energy/Oil & Gas
dewa
GMR
Lamprell
JERA
CAIRNS CITY COUNCIL
Crescent Petroleum

Airports/Airlines
malaysia airlines
ABU DHABI AIRPORTS
SAUDIA

Public Sector
Dubai Electricity & Water Authority
DEPARTMENT OF ENERGY
CapitaLand
GOVERNMENT OF DUBAI
rakez
Sharjah Digital Office
DUBAI POLICE
Federal Authority For Government Human Resources

Legal
KHAITAN & CO — Advocates since 1911
Shardul Amarchand Mangaldas

Automotive
Hero
TATA MOTORS

Healthcare & Pharma
SAUDI GERMAN HOSPITAL DUBAI
Biocon
EVERISE
SmithNephew
AVANOS

Education
جامعة خليفة Khalifa University
الإمارات العربية المتحدة وزارة العدل
جامعة الملك عبدالله للعلوم والتقنية King Abdullah University of Science and Technology

Media & Telecom
etisalat
MMS — MBC MEDIA SOLUTIONS
ALKASS — AL KASS SPORTS CHANNELS
Virgin mobile
du
TATA PLAY

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Innovative AI powered
Product Offerings

Microsoft Global
AI Partner

Collaboration with
Microsoft Research Team
for latest Innovations

Databricks Elite
partner

USPs

75+ GenAI solutions
into production

Cloud Agnostic
with wide range of
LLMs

Center of Excellence (COE)
Team for optimal project
delivery practices
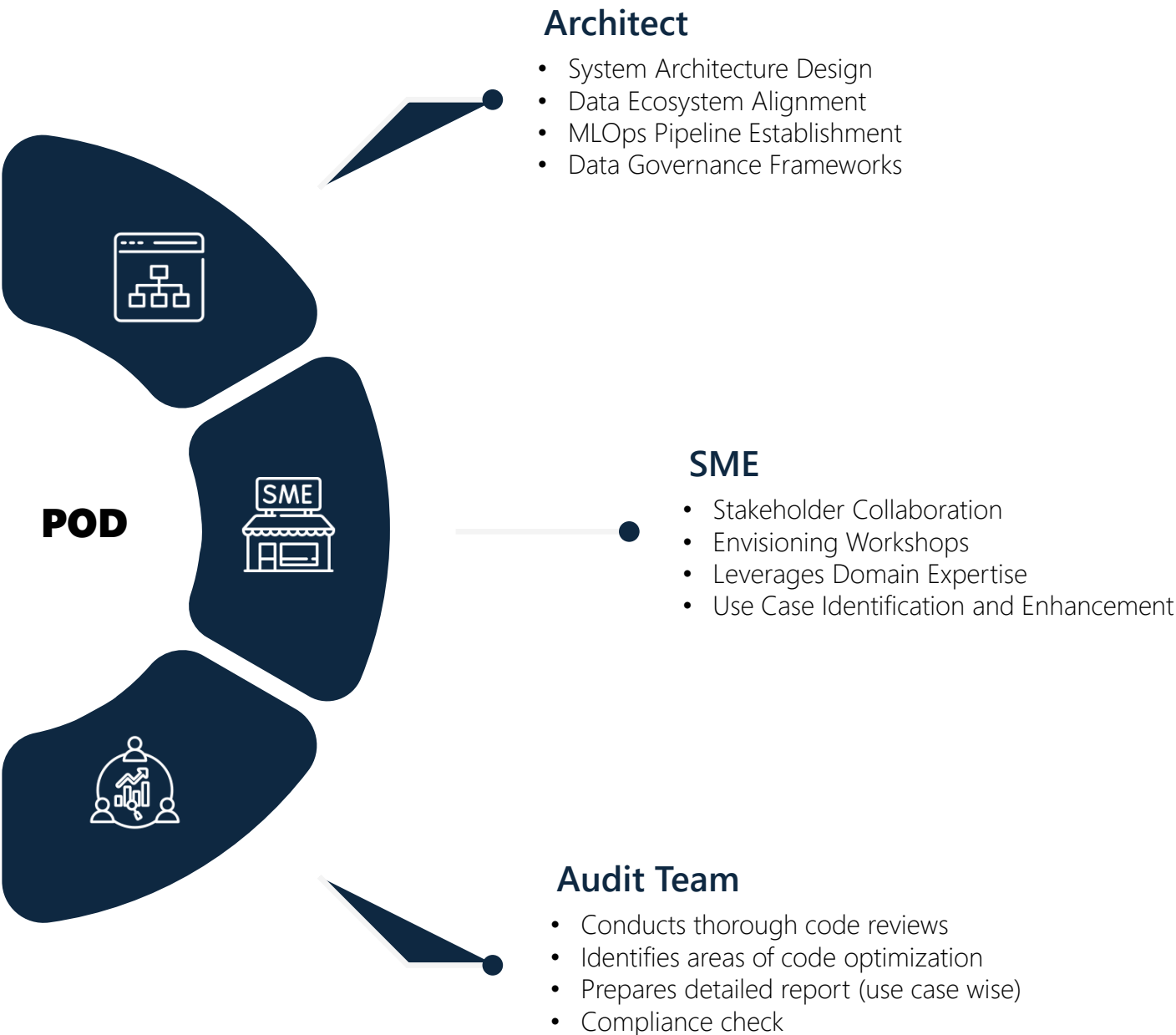
Cutting-Edge
Technology Expertise

Centre of Excellence – CDWT

Centre of Excellence

POD

Architect
- System Architecture Design
- Data Ecosystem Alignment
- MLOps Pipeline Establishment
- Data Governance Frameworks

SME
- Stakeholder Collaboration
- Envisioning Workshops
- Leverages Domain Expertise
- Use Case Identification and Enhancement

Audit Team
- Conducts thorough code reviews
- Identifies areas of code optimization
- Prepares detailed report (use case wise)
- Compliance check

Coding Best Practices

PEP8   SHAP   Read me files

MLOPs
Data Ops, Devops, MLOPS, Model Serving , Configuration Management

Security
PII Masking, Disconnected container set up, Access controls,

Align security practices with ISO/IEC 27001 standards, Zero Trust Security Model, Multi Factor Authentication

Responsible AI
Azure responsible AI, AI fairness 360, IEEE best practices
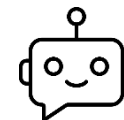
Solution Accelerators

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SIVA Call Center Analytics
AI-powered solution for call centers with post-call auditing

Gatekeeper Automation
Analyze any email's content and identify its tag and intent

SAP x Teams Query Bot
Real-time information about finance-related queries

Deep Domain Copilots
Manufacturing
FSI
Retail

Employee Assistant Bot
Helps employees get answers to their questions related to HR policies, benefits, payroll, and other workplace issues

AI as a Tutor
Provide personalized learning experiences for students, based on their individual learning styles, interests, and abilities
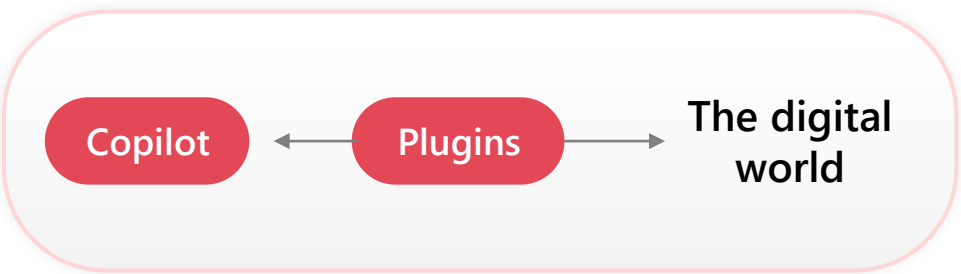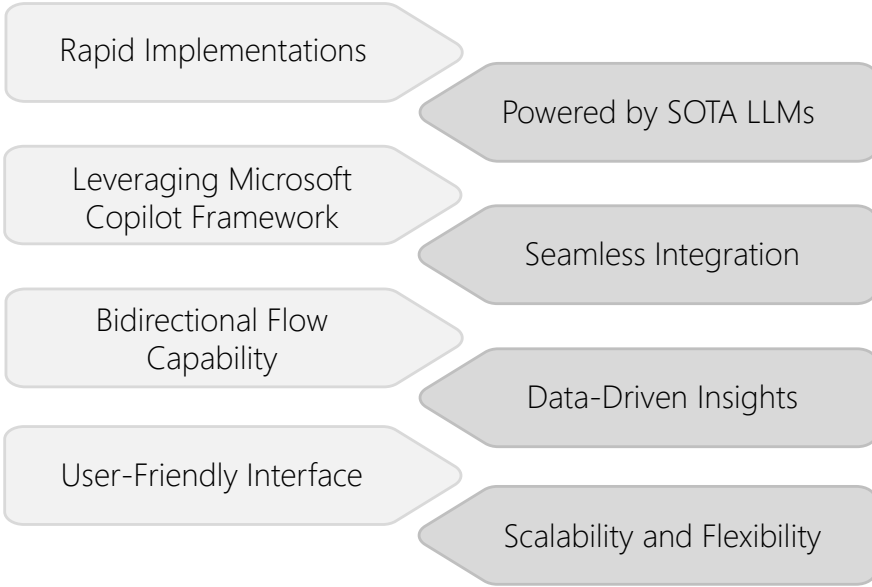
RSS Machine
Gather industry news from various sources and classify them into different categories

CDWT -Miner Knowledge Mining
Automated system designed to process many documents

Copilots

Our USP

- Rapid Implementations
- Powered by SOTA LLMs
- Leveraging Microsoft Copilot Framework
- Seamless Integration
- Bidirectional Flow Capability
- Data-Driven Insights
- User-Friendly Interface
- Scalability and Flexibility

Copilot ←→ **Plugins** ←→ **The digital world**

HR Copilot

- Automated Employee Onboarding
- Employee Engagement Monitoring:
- Performance Management Analytics
- Skills and Training Gap Analysis
- Predictive HR Analytics

Procurement Copilot

- Automated Purchase Requisition
- Supplier Performance Analysis
- Spend Analysis and Cost Optimization:
- Inventory Management
- Market Intelligence

Sales Copilot

- Lead Prioritization
- Sales Performance Tracking
- Automated Sales Reports
- Sales Forecasting
- Customer Sentiment Analysis

Finance Copilot

- Automated Expense Tracking
- Cash Flow Management
- Predictive Financial Analysis
- Vendor and Invoice Management
- Compliance and Risk Monitoring

Recruitment Copilot

- Automated Candidate Sourcing
- Resume Screening and Ranking
- Diversity and Inclusion Analytics
- Interview Scheduling Assistant
- Candidate Experience Tracking

Customer Copilot

- Customer Satisfaction
- Quick 24/7 support service
- Automating complex processes
- Document providing based on specific request

Legal Co-pilot

- Legal Document analyser
- Automated Document Generation
- Legal Documents Q&A

Operator Co-Pilot

- Metaverse of Operator Working simulations
- Operator Manual Q&A bot
- Performance monitoring

Teacher Co-Pilot

- Teaching Recommendations
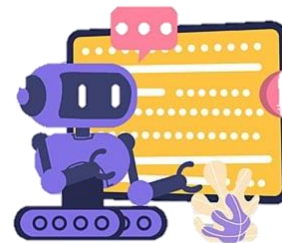- Schedule Automation
- Ease-Strict Evaluation

Student Co-Pilot

- AI-enabled Continuous Practice – Spoken and written
- Personalized Learning and adaptability
- Recommendations over the evaluation for improvement

EHS Co-pilot

- Safety and Compliance Chatbot
- Real-time Alarm, Reminder Alert
- Incident Detection
- Compliance Deviations

Intelligent Research Assistant

- Data-Driven Insights
- Interactive Dashboards
- Analysis and Research Assistant
- Recommendations

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OPERATIONS AND MANUFACTURING
- Remote Worker Assistance
- Production Planning Co-Pilot
- KPI Bot for Executive Governance
- BOM Explosion

R&D
- Market and Competitive Analysis
- Research Archive Summarization
- Entity Compound Relation Extraction
- Simulation and Testing

SUSTAINABILITY & ENVIRONMENTAL INITIATIVES
- Carbon Footprint Analysis
- Energy Optimization
- Supply Chain Sustainability
- Social Reporting

MARKETING
- Automatic Marketing Emails
- News and Trends - Mining the web content for latest news and trends.
- Marketing Content Generation

QUALITY ASSURANCE AND TESTING
- Quality Control Automation
- Root Cause Analysis

IT
- IT Inventory Management
- IT Helpdesk Automation

FINANCE
- Financial ERP Co-Pilot
- Investor Relations Co-pilot
- Financial alert assistant for deadlines, compliance breach etc.

- Demand Sensing
- Procurement Co-Pilot
- Inventory Management Assistant

SUPPLY CHAIN AND LOGISTICS

SALES
- Contact Centre Analytics
- Field Sales Assistant
- Scheme Recommendation Engine

- Compliance Training
- Consumer Complaint Analysis
- Audit Support
- Regulation Content Versioning

REGULATORY COMPLIANCE

LEGAL AND COMPLIANCE
- Legal document generator
- Document search
- Document summarisation
- Summarise audio transcripts

PROCUREMENT
- Request for Proposal Generation
- Goods Receipts Note Generation
- Demand Forecasting
- Inventory Optimization

HR
- Employee Onboarding Copilot
- Talent Acquisition Copilot
- Employee Engagement and Feedback

TRAINING AND DEVELOPMENT
- Personalized Training
- Skill Assessment and Gap Analysis
- Chatbots for On-Demand Support
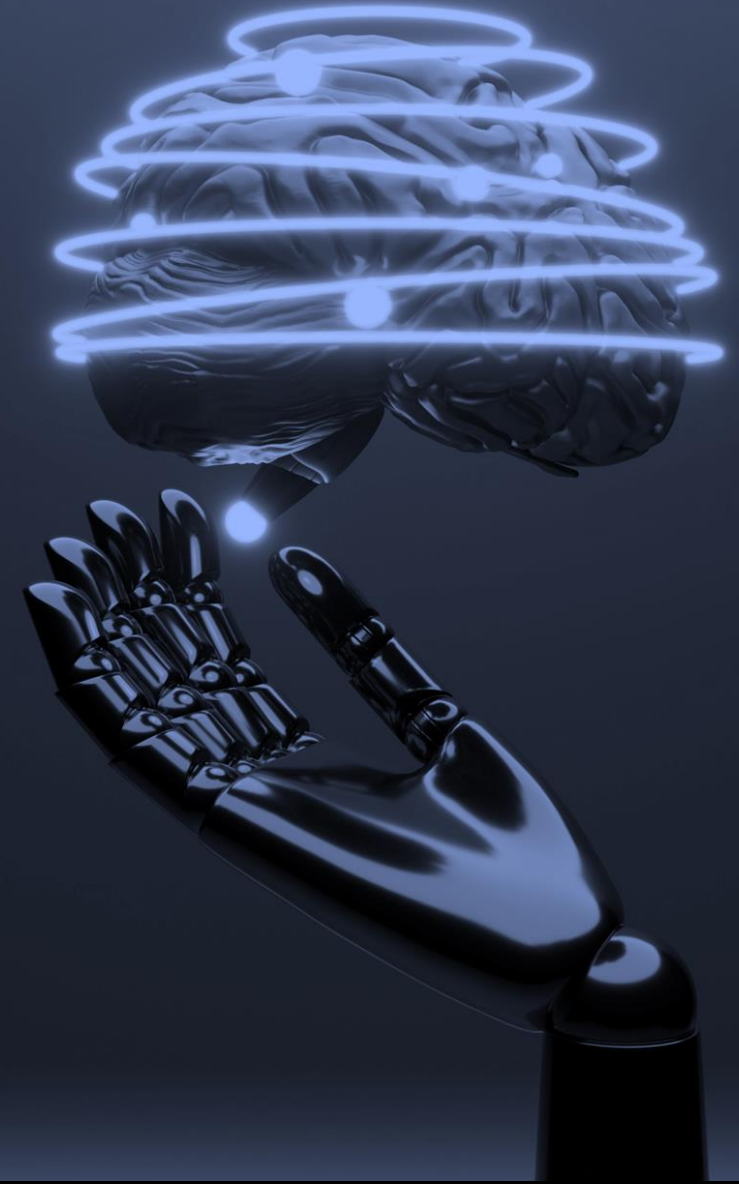
CUSTOMER SUPPORT
- Post-call Analytics & FAQ Chatbot
- Personalized Recommendations
- Ticket Routing

PUBLIC RELATIONS
- Media Monitoring and Analysis
- Media Outreach Recommendations
- Content Creation

AI/ML CoE Approach

Assessment Framework – Key Elements

Evaluating the technical and operational feasibility of implementing the use case.

Identifying and assessing the associated risks of implementing the use case.

Involving key stakeholders and gathering their input on each use case's alignment with organizational goals and priorities.

AI Vision Alignment

Feasibility

ROI Analysis

Risk Assessment

Strategic Importance

Stakeholder Input

Validation and Consensus

Assessing the extent to which the use case aligns with the organization's AI vision and long-term objectives.

Estimating the potential return on investment from AI adoption.

Considering the strategic importance of the use case within the industry and market.

Involves reaching an agreement or confirming the accuracy, completeness, or validity of certain information, processes, or decisions.

Delivery Models

- CDWT team and OldCastle team will collaborate for a thorough discovery of modules and ROI analysis.

- Additionally, the CDWT team will conduct an end-to-end risk assessment to gain a detailed understanding of the implementation of the future scope.

Discovery & Assessment

- Post Discovery and Assessment, CDWT team will proceed to implement the MVP use-cases based on the previous phase.

- In this phase, the CDWT team will deliver a Classical Machine Learning MVP along with 2 GenAI MVPs.

MVP Plan

- The final solution MVPs will be executed in the production environment, incorporating established scaling and optimization methodologies.
- The solution will seamlessly integrate with the client's internal systems and is set to go live for extensive usage

Production Plan

Key Elements - GenAI

Prompt Engineering

❖ CDWT employs two unique techniques for generating AI prompts: "COT" (Chain of Thoughts) and "TOT" (Tree of Thoughts) to enhance input quality.

❖ We are also exploring advanced techniques such as "React Prompt Techniques" to make AI interactions more dynamic and insightful.

❖ Additionally, we actively use Neo4j, a graph database technology, to efficiently manage complex data relationships, which enhances AI applications and data analysis.

Wide Range of LLMs

❖ Diverse Language Model Expertise:
❖ Proficiency in various Language Models (LLMs) such as GPT-based, Lamma-2, T5, and Claude-2.
❖ Scalable Solutions:
❖ Independently implemented and hosted solutions on our servers for seamless large-scale utilization of these models.
❖ Versatile Problem Solving:
❖ Applied these LLMs to address a wide range of tasks and challenges with high effectiveness, including AWS Bedrock models.

PII Masking

❖ Instead of masking personally identifiable information (PII), we use encryption and decryption.
❖ We encrypt the data and pair it with dummy information before sending it to the Azure OpenAI model.
❖ After receiving the model's response, we decrypt the data to access the original information.
❖ We employ Azure's Lamma-2 7b Named Entity Recognition (NER) model and regular expressions (regex) patterns to identify entities.
❖ This comprehensive approach safeguards sensitive information while maintaining data usability.

Guard Rails & Hallucination Control

❖ Adherence to Company Guidelines: Implementation of guardrails in GPT-based models to ensure bot compliance with company rules and guidelines for user interactions.
❖ Varied Guardrail Experience: Extensive experience with both Guardrails AI and NeMo Guardrails, each serving unique purposes without direct comparison.
❖ Customizable Control: For those comfortable with XML syntax, Guardrails AI offers the ability to experiment with and maintain control over bot responses, aligning them with company guidelines.

Discovery and Assessment Cycle

Objectives

Phase 1
DISCOVERY

- Interview stakeholders
- Interview business SMEs
- Interview technical SMEs
- Establish current state and agree on target state
- Identify Critical success factors
- Onboard resources
- Understand current Data Architecture
- Checking AI framework access and needs
- Define Solution Architecture

Phase 2
ASSESSMENT

Risk Assessment & ROI Analysis

- Assess cloud costs for development.
- Gauge resource requirements.
- Evaluate resourcing costs and volumetrics.
- Estimate support and maintenance costs.
- Assess indirect ROI factors (CSAT, NPS, Market Sentiment, etc.).
- Review current network architecture and landing zone.
- Determine the need for a new landing zone or network architecture.
- Evaluate the organization's existing security measures and protocols.
- Assess the potential for AI models to produce hallucinatory results.
- Identify potential risks in ERP data integration and synchronization.

Industry Research

- Conduct surveys, interviews, or focus groups to gather insights into customer needs, challenges, and pain points that the AI solutions could address.
- Research and provide case studies or examples of successful AI use cases in the industry.
- Investigate how customers are adopting such use cases in the industry.
- Assess the user experience and user feedback related to the use cases implementation
- Explore different business models and monetization strategies
- If relevant, consider geographic variations in the industry landscape, regulations, and customer preferences.
- Summarize key findings and provide recommendations for how the organization can strategically position its AI initiatives within the industry.

Phase 3
Consolidation

- Encourage stakeholders to provide feedback on the assessment process, its transparency, and the alignment of use cases with organizational goals.
- Present the assessment results, including scores and rankings, to stakeholders
- Validate the ROI estimates and feasibility assessments for top-priority AI use cases with finance and technical experts.
- Review the risk assessment findings and mitigation strategies with relevant stakeholders.
- Fine-tune the prioritization based on consensus.
- Present the final prioritization to stakeholders for their approval and endorsement.

MVP Delivery Cycle

MVP Development

Infra Set-up and Source integration

Data Processing and orchestration

Code Development

UI integration

UAT and Optimization

Infra Set-up and Source integration

- Implementing all the network connections
- Define detailed level of security challenges and solutions
- Integrating all the secured connections for Data and product security.
- Configurational changes in client's landing zone for better integration.
- Azure services implementation
- Assessing various forms of data sources.
- Gathering source and sink information from respective SMEs
- Integrating secured data connection pipelines for seamless data transfer.
- Assessing the latency and optimization

Data Processing and orchestration

- Identify and extract relevant data sources for the use case, ensuring completeness and documenting the extraction process
- Cleanse the extracted data by addressing missing values and inconsistencies, then conduct exploratory data analysis (EDA) for pattern identification.
- Generate data embeddings using appropriate techniques like word embeddings or feature extraction, fine-tuning parameters.
- Develop an indexing strategy to efficiently organize and retrieve data
- Implement selected indexing mechanisms to improve data retrieval and ensuring relevant data for indexer training.
- Implementation of a data pipeline to automate the above tasks.

Code Development

- Generate data embeddings using suitable techniques, ensuring the preservation of semantic relationships.
- Fine-tune embedding parameters for optimal representation and conduct thorough validation to ensure quality.
- Develop an indexing strategy specifically tailored for embeddings to enhance retrieval efficiency.
- Implement the chosen indexing mechanisms, validate their effectiveness, and optimize for computational performance.
- Create the intent model using the preprocessed and embedded data.
- Choose appropriate algorithms or models based on the project's objectives and requirements.
- Train and validate the intent model, ensuring it accurately captures semantic relationships and aligns with the project goals.

UI integration

- Begin UI development for each use case, ensuring a user-friendly and intuitive interface.
- Incorporate design elements that facilitate efficient user interaction and responsiveness.
- Integrate APIs into the UI to enable seamless communication between the user interface and backend systems.
- Verify API functionality, handling errors, and implementing secure communication protocols.
- Fine-tune the OpenAI model based on the specific requirements of the use-case.
- Experiment with hyperparameters, input variations, and other model tuning techniques to optimize performance.
- Validate the tuned model against relevant benchmarks, ensuring it meets the desired accuracy and effectiveness.

UAT and Optimization

- Conduct thorough testing of the entire system, including UI functionality, API integrations, and model performance.
- Perform a comprehensive gap analysis to identify any discrepancies between expected and actual outcomes.
- Address gaps in data quality, model predictions, or system behavior to enhance overall performance.
- Optimize the OpenAI model based on insights from testing, evaluation, and gap analysis.
- Fine-tune parameters, adjust algorithms, and refine processes to achieve optimal performance.
- Ensure a seamless transition from testing to deployment, monitoring for any issues during the initial deployment phase.

Production Delivery Cycle

Production Set-up

Azure Environment Setup Assessment

Access Resource Group created on tenant

Create and configure Infrastructure pre-requisites for PROD environment

Create Azure Resources as per Production BOM

Data & ML Pipelines and implementation

Data Preprocessing and Indexing Pipelines Setup

Preprocess the PDF documents to extract text from them

Store the extracted text in Azure Blob Storage

Query the index based on specific keywords or phrases

User Acceptance Testing

Deploy and test the final version of the project to the dev environment for end-user access

QA system improvement as per UAT feedback

Session Caching & Logging

Session Caching

Configure and implement logging for users

Monitor the performance and usage of the project

Implement a Session Caching mechanism to store user session data and improve performance

AKS Set-up & Integration

Azure Kubernetes Setup and Multi-Container Deployment

Deploying the chatbot frontend & backend on AKS

UAT Sign off on all products in production environment

Optimize APIs for maximum performance and efficiency

Test all the flows in chatbot in production environment

Perform Load Testing to ensure the project can handle expected user loads and traffic

Success Stories

Key Learnings from our Implementations

Addressing Change Management and Employee Resistance

- Communication strategies, training sessions, and involving employees in decision-making processes.

- Helped them with value realization.

Integrating AI with Existing Workflows
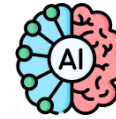
- Collaborated closely with IT teams to design and implement seamless integration strategies.

- Utilized agile methodologies to incrementally introduce AI solutions, minimizing disruptions and ensuring a smooth transition.

Ensuring Cross-Functional Collaboration

- Established cross-functional teams within the CoE, encouraging open communication channels and knowledge-sharing.

- Organized regular interdisciplinary workshops to foster collaboration and break down organizational silos.

Managing Budget Constraints and Resource Allocation

- Prioritized AI projects based on their strategic importance and potential impact.

- Explored cost-effective technologies and sought external funding through partnerships, grants, or collaboration with industry and research institutions.

Demonstrating Quick Wins and Early Successes

- Prioritized short-term projects with POCs and MVPs, ensuring quick wins and immediate business impact.

- This approach instilled confidence and enthusiasm, highlighting the CoE's effectiveness early in its implementation.
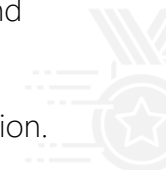
Ensuring Scalability of AI Solutions

- Designed AI solutions with scalability in mind, utilizing cloud-based infrastructure and scalable architectures.

- Conducted regular capacity planning and performance testing to ensure readiness for increased workloads.
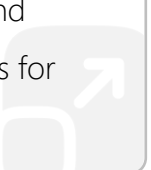
Economic industrial hub

Powerhouse Business Hub and Economic Zone in the
United Arab Emirates that provides
free zone and non-free zone company formation services to
entrepreneurs and investors
from various sectors and industries.

Largest Economic Zone hosting

18,000 companies from **50+** industries

Company offers a range of benefits to its clients, such as 100% foreign ownership, tax exemptions, customizable facilities, simplified and fast-track processes, and access to regional and global markets.

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2,478 KM² AREA

355,005* POPULATION

64 KM COASTLINE

AED 36.3 BN* GDP

27° C AVERAGE TEMP

*2016 estimates from RAK Centre for Statistics & Studies

Major Takeaways

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Mapping of business problems with the possibilities of GenAI

Use Cases Ideation Workshops in each divisions of the organization

Lack of awareness on Gen AI

Educated the major stakeholders by conducting training sessions

Need of Collaboration with Operational Team Stakeholders

Created Re-usable AI assets (To be used by HR, IT and Finance Team)

Skepticism among middle management regarding ethical implications of Gen AI

Educated the stakeholders on responsible **AI practices, guardrails, and AI hallucination controls.**

AI USE CASE EXPLORATION WORKSHOP SNAPSHOT

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AI Thought Starter

Pre-Work Discussion with Stakeholders

AI Workshop

41 ideas listed

Post Workshop Analysis

- 41 Ideas
  - 8 Digital
  - 12 Data
  - 19 AI

AI Ideas by Dept.

- 1
- 2
- 1
- 2
- 3
- 1
- 3
- 1
- 5

AI Ideas by Category

- 8 Process
- 6 Cost
- 5 Revenue

Legend:
- Commercial
- Compliance
- Development
- Finance
- HR
- IT
- Legal
- Procurement
- Registrar

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Legals

HR
Department

Finance

Commercial

Celebal provided it's extensive support to Client by providing a group of Architects and Data scientists to develop and implement these 19 solutions across their organization.

Out of the **40** ideas, **19** AI based ideas were listed & an initial prioritization was done based on "business impact" & "feasibility".

AI STRATEGY

Vision

Value

Adoption

Risks

Delivery Excellency

Regression
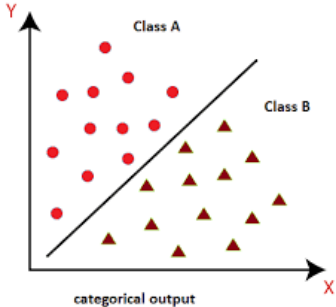
Classification
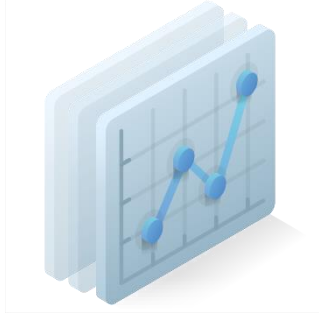
Timeseries
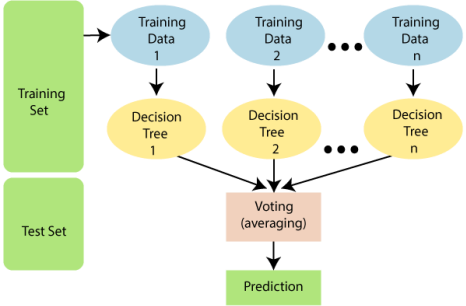
Ensemble Models
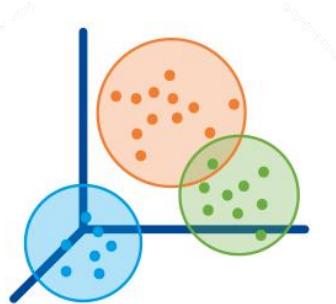
Clustering

LLMs

Advanced Analytics Capabilities

AI Services

Cognitive Services

Azure Machine Learning

- SKU-Sales Channel Forecasting
- Lead Scoring
- Route Optimization
- Supplier Selection
- Knowledge Mining for Intelligent Search
- Cash Flow Forecasting
- Target Sizing for Investment Banking
- Fraud Detection
- Reverse Logistics
- Supplier Risk Management
- Automated Expense Management
- Demand Forecasting
- Inventory Optimization
- Anomaly Detection

- Dynamic Pricing
- Predictive Maintenance
- Customer Churn Prediction
- Recommendation Engines
- Quality Control
- Warehouse Optimization
- Golden Batch Prediction
- Complaint Management
- Robotic Process Automation
- ML Ops
- Spend Analytics
- P&L Analytics

MLOps and LLMOps

Microsoft

MLOps Functionalities

Model Versioning
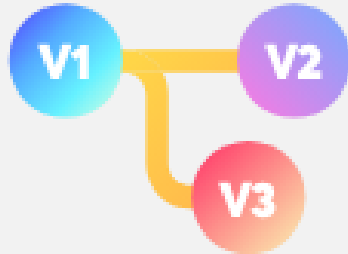
Models are can be registered on multiple versions for model backtracking.

Model Validation

Models are evaluated using a set of data before registration, assuring the registration of better model.

Model Interpretability

Models can be interpreted according to their feature selection behavior.
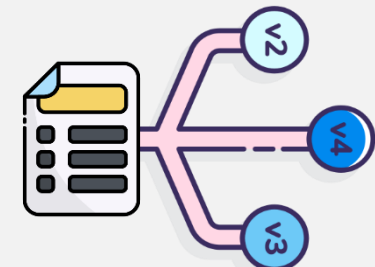
Model Monitoring
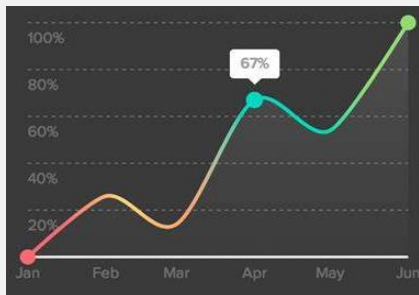
Monitoring capabilities of model performances over time.

Data Drift
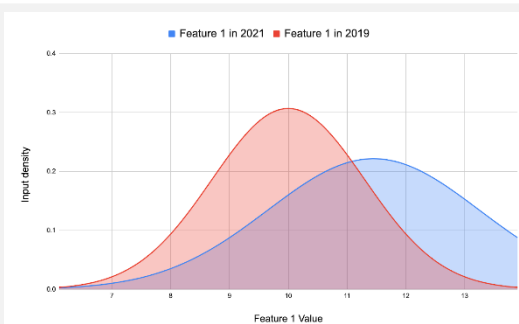
Checking for the change in data properties on the newer data as compared to older data.

Data Versioning

The data can be registered and versioned, incase of data and model performance backtracking.

Accelerate Automation and Reproducibility of ML Workflows

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Build machine learning workflows and models

Build machine learning pipelines to design, deploy, and manage reproducible model workflows.

Easily deploy highly accurate models

Package models quickly and ensure high quality at every step using model profiling and validation tools.

Efficiently manage the entire ML lifecycle

Optimize model training and deployment pipelines and build for CI/CD to facilitate retraining,.

Achieve governance across assets

Track model version history and lineage for auditability. Set compute quotas on resources and apply policies.

Collaborative MLOps across workspaces

Promote, share, and discover models, environments, components, and datasets across teams.
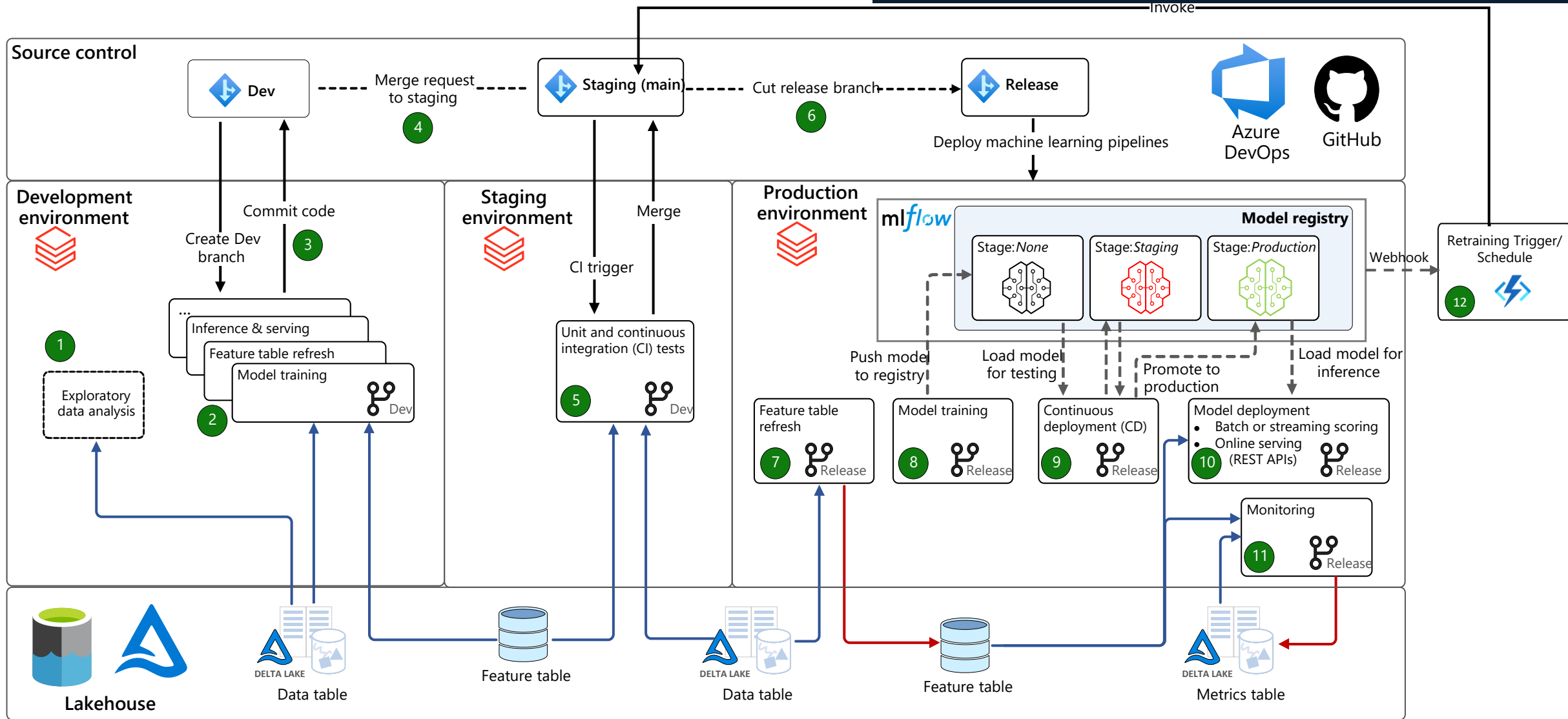
☑ Model Reproducibility ☑ Model Validation ☑ Model Deployment ☑ Model Retraining
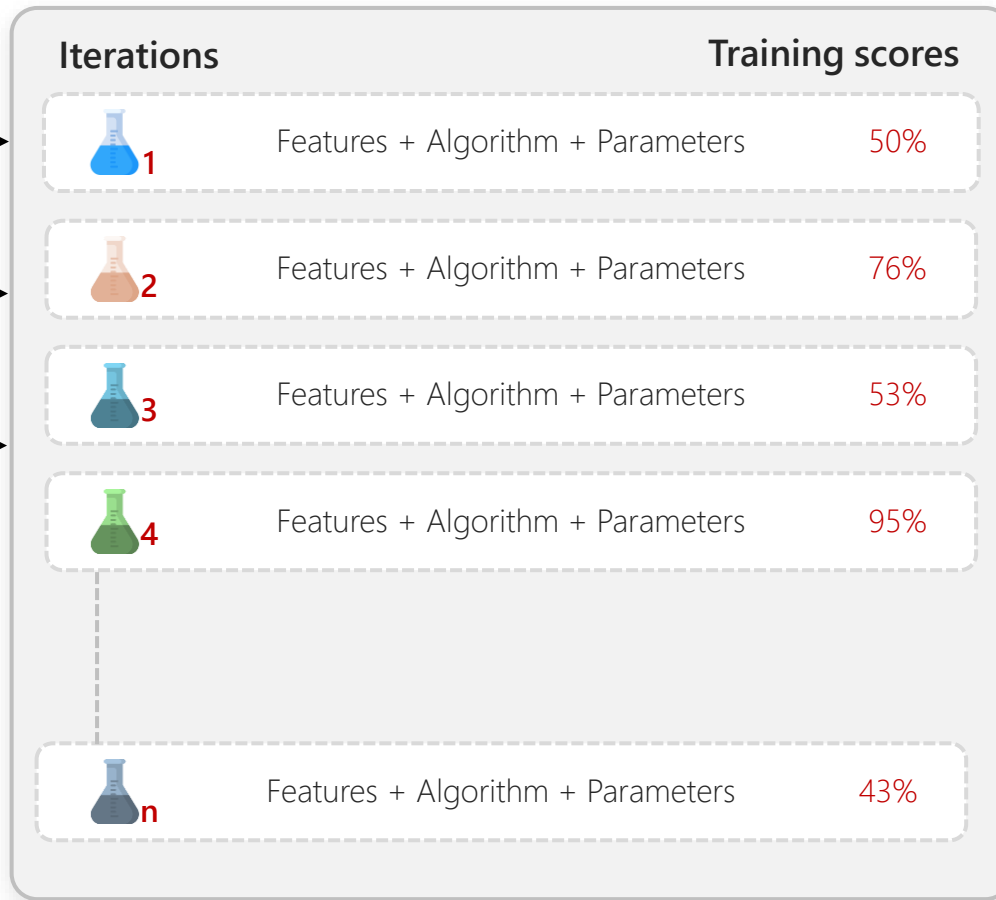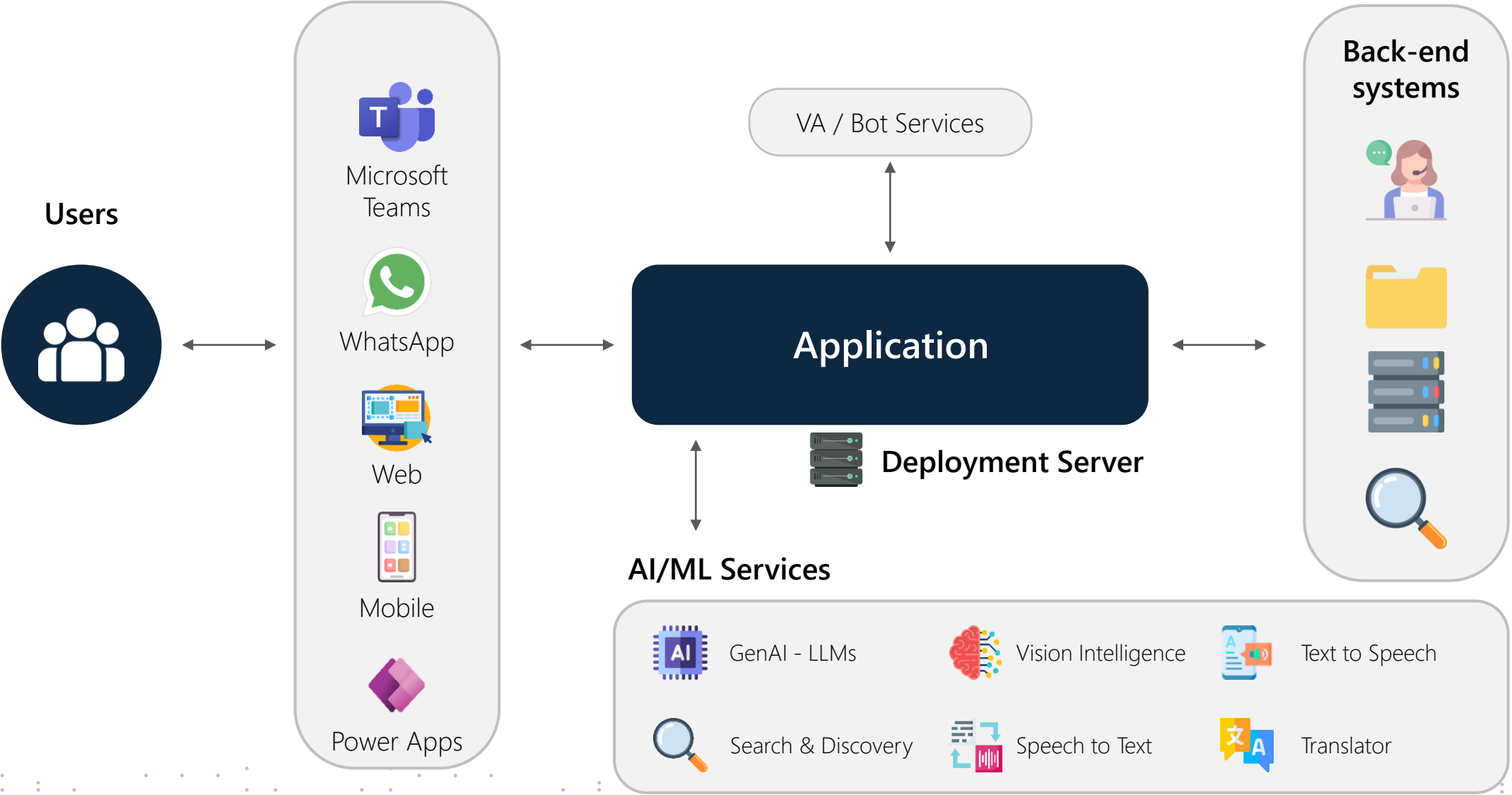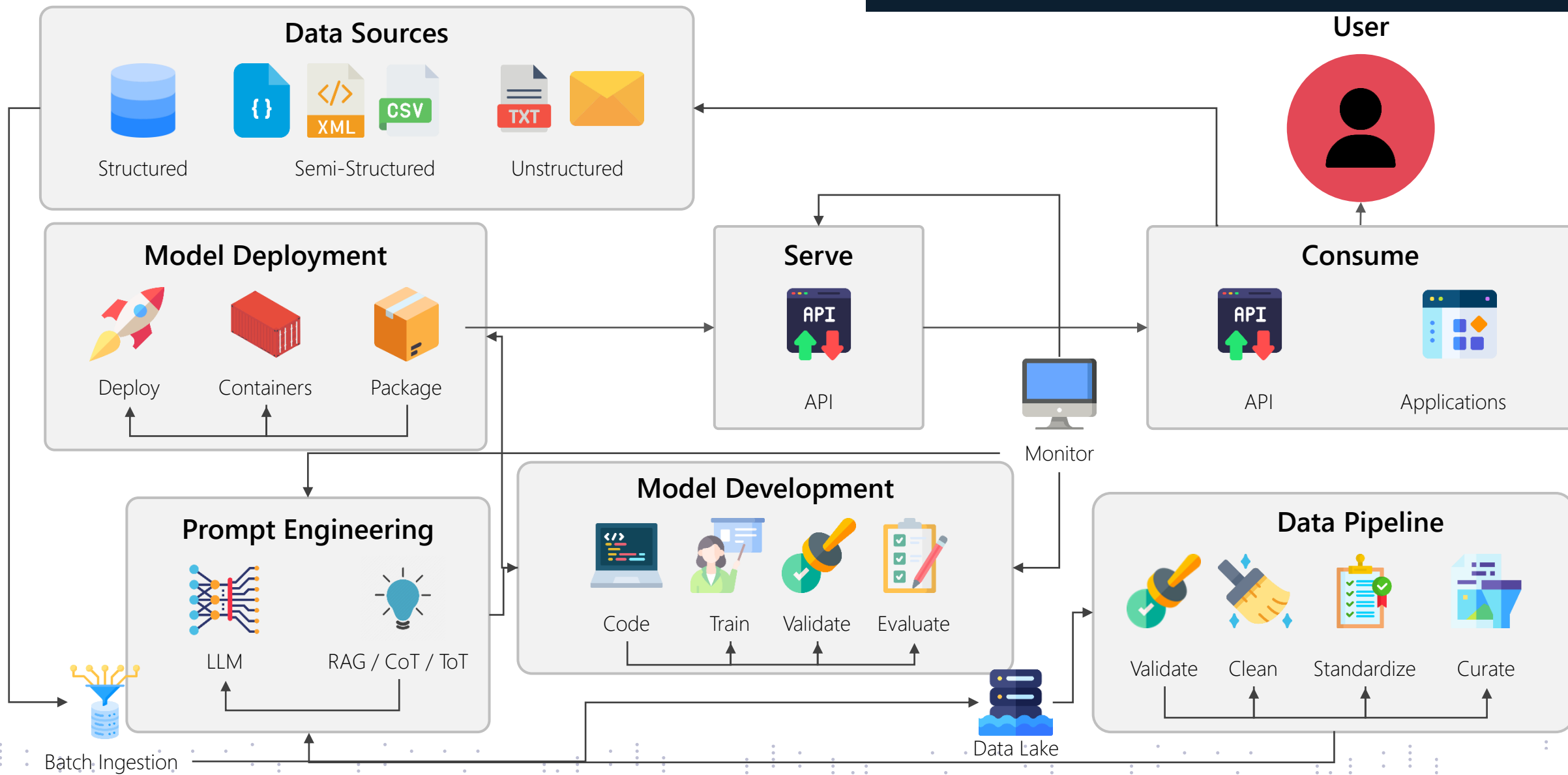
MLOps Architecture

Automated Machine Learning

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User inputs

Automated machine learning

Data

Target metric

Constraints (time/cost)

Iterations		Training scores
1	Features + Algorithm + Parameters	50%
2	Features + Algorithm + Parameters	76%
3	Features + Algorithm + Parameters	53%
4	Features + Algorithm + Parameters	95%
n	Features + Algorithm + Parameters	43%

Leaderboard

Rank	Model	Score
1		95%
2		76%
3		53%

Generative AI: Solution Design Thinking

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Users

Microsoft Teams

WhatsApp

Web

Mobile

Power Apps

VA / Bot Services

Application

Deployment Server

Back-end systems

AI/ML Services

GenAI - LLMs	Vision Intelligence	Text to Speech
Search & Discovery	Speech to Text	Translator

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Let's leverage our expertise at CDWT to forge impactful partnerships and thrive.

Thank you!