Problem Statement

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ERP System
Graduation project Cycle 3

nexus

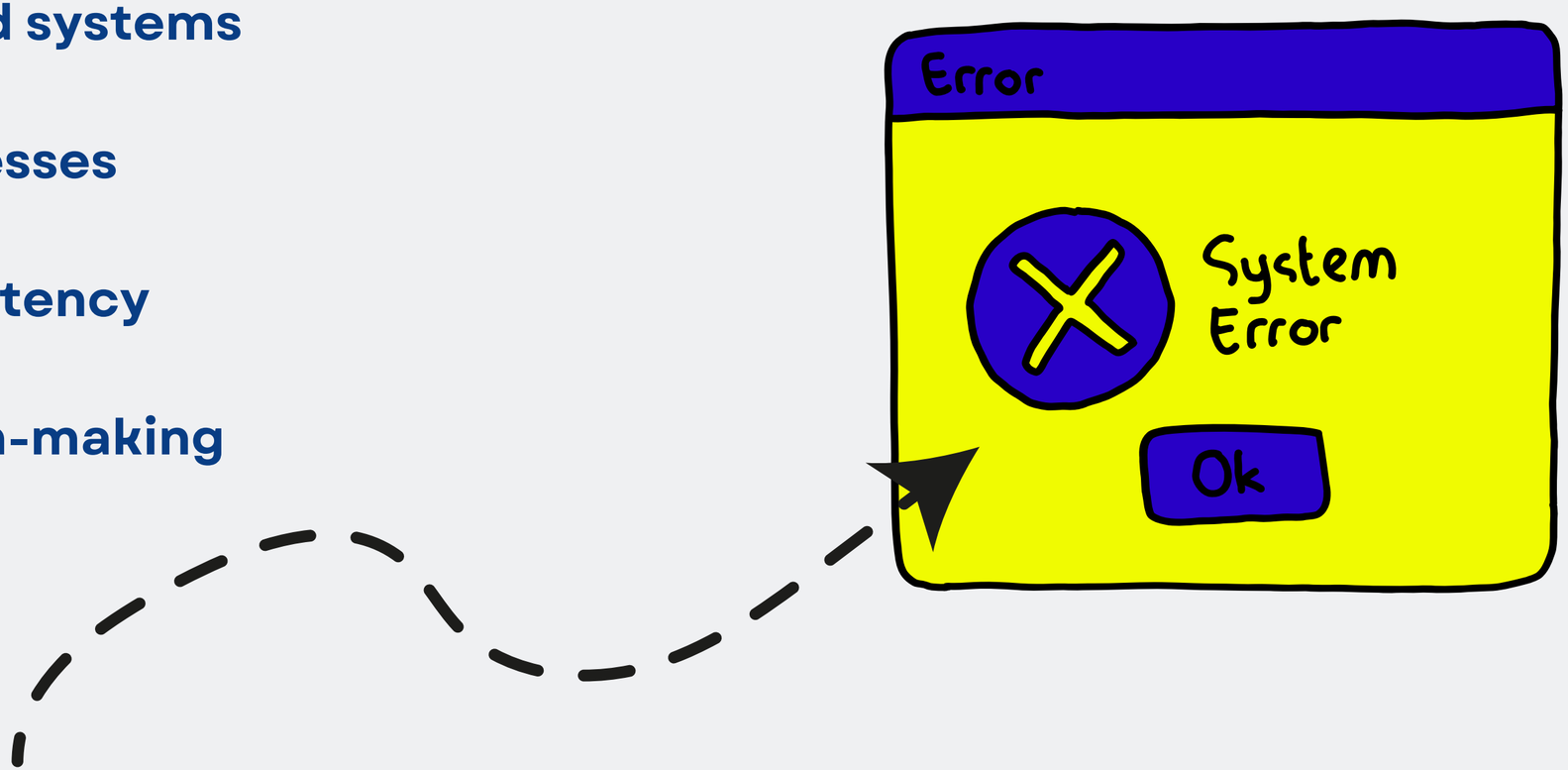
Team 6

Problem Statement

Problem Statement & ERP Vision

Problem Statement

- Disconnected systems
- Manual processes
- Data inconsistency
- Slow decision-making



nexus

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Why ERP?

- One centralized system
- Shared database
- Real-time data
- Process automation

Problem Statement

Problem Statement & ERP Vision

Our ERP Vision

- Integrated business modules
- Intelligent analytics
- Secure cloud infrastructure
- Scalable architecture

Problem statement

HR

HR Module & Objective

HR Module

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Objective

Digitize HR processes to improve efficiency, reduce manual work, and enhance employee experience through a unified ERP system.

Problem statement

HR

Employee Lifecycle Management

Employee Lifecycle Management

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The HR module covers the full employee lifecycle from hiring to offboarding, ensuring all HR operations are centralized and automated.

- Recruitment & Hiring
- Attendance & Leave Management
- Performance Evaluation
- Offboarding
- Onboarding
- Payroll
- Training & Development

Problem statement

HR

Digital HR Workflows

Digital HR Workflows (ERP Ready)

HR policies were transformed into automated, ERP-ready workflows to ensure consistency, accuracy, and faster decision-making.

- Online leave requests & approvals
- Automated payroll rules
- Structured performance review processes
- Reduced manual follow-ups

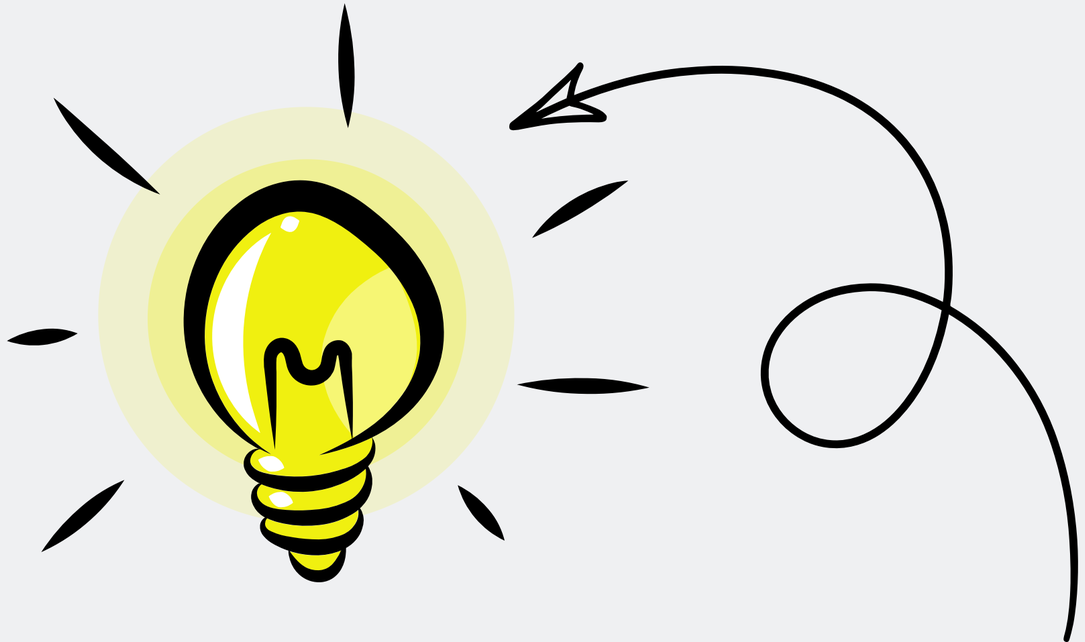
Problem statement

HR

HR Outcome

HR Module Outcome

A fully digital HR framework that improves operational efficiency, supports data-driven decisions, and enhances overall employee experience.



Problem Statement | HR | Finance

Insert your topic here

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The Overview

Designed Finance module within an ERP system for Konecta and Focused on end-to-end financial cycle automation, we Covered: Invoicing, Expenses, Budgeting, Payroll and Ensured integration, approval workflows, and accounting posting and Ensured integration with HR, Accounting, and Budget control and Aimed to enhance financial control, transparency, and decision-making.

Problem Statement | HR | Finance

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Core Financial Processes

- Invoicing: approval → client → payment → accounting
- Expenses: employee → manager → budget → finance
- Payroll: HR data → salary calculation → approval → payment
- All processes follow validation and approval workflows

Finance Module – Key Achievements

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Invoicing Module:

- Create and manage client invoices
- Approval workflow before sending to client
- Automatic PDF generation and email dispatch
- Payment tracking (Sent, Overdue, Paid)
- Automatic posting to General Ledger

Expense Tracking Module:

- Employees submit expenses with receipts
- Manager approval workflow
- Automatic budget consumption update
- Finance notified for reimbursement
- Full audit trail for all expenses

Problem Statement | HR | Finance

Insert your topic here

Finance Module – Key Achievements

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Budgeting Module:

- Create annual or quarterly budgets
- Define budget lines per department or cost center
- Real-time tracking: Planned vs Actual spend
- Automated alerts when consumption exceeds thresholds
- Budget expiration and performance reporting

Payroll Module:

- Integrated with HR attendance and contracts
- Automated payroll batch creation
- Gross, deductions, and net salary calculation
- Finance approval before payment
- Automatic GL posting and bank payment file

Problem Statement | HR | Finance

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Conclusion & Business Impact

- Designed ERP finance workflows, not just accounting entries.
- Simulated real corporate financial processes
- Hands-on exposure to enterprise ERP design.
- this project was not about building financial features, but about designing how finance actually operates inside a real company.

Introduction

A Full Stack ERP (ERB) System is a complete digital system that manages an organization's activities such as HR, payroll, finance, and operations using integrated software technologies.

It combines front-end, back-end, database, and integration layers into one unified platform.

Explanation:

Instead of using separate systems for each department, ERP connects everything into one system, improving efficiency and accuracy.

Front-End Layer

- **What it is:**

The front-end is the user interface of the ERP system.

- **Examples:**

Employee portals
HR dashboards
Admin panels

Explanation:

This is where employees and managers log in, apply for leave, view payroll, and access reports.
A good front-end makes the system easy to use and user-friendly.

Back-End Layer

- **What it is:**

The back-end handles business logic and processing.

- **Examples:**

Payroll calculation
Leave approval rules
Performance evaluation processing

Explanation:

When a user performs an action on the front-end, the back-end processes the request and applies company rules before saving the data.

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Database Layer

- **What it is:**

The database stores all ERP data securely.

- **Data Stored Includes:**

Employee records
Attendance data
Salary details
Training history

Explanation:

All information is stored in one centralized database, ensuring data consistency, accuracy, and easy access.

Integration Layer

- **What it is:**

This layer connects different ERP modules and external systems.

- **Examples:**

HR module connected to payroll
ERP connected to finance system
Attendance machines connected to ERP

Explanation:

Integration allows automatic data sharing, avoiding duplicate entries and reducing errors.

Security Layer

- **What it is:**

Security controls access and protects data.

- **Features:**

Role-based access
Login authentication
Data encryption

Explanation:

Only authorized users can access specific data, ensuring confidentiality and compliance.

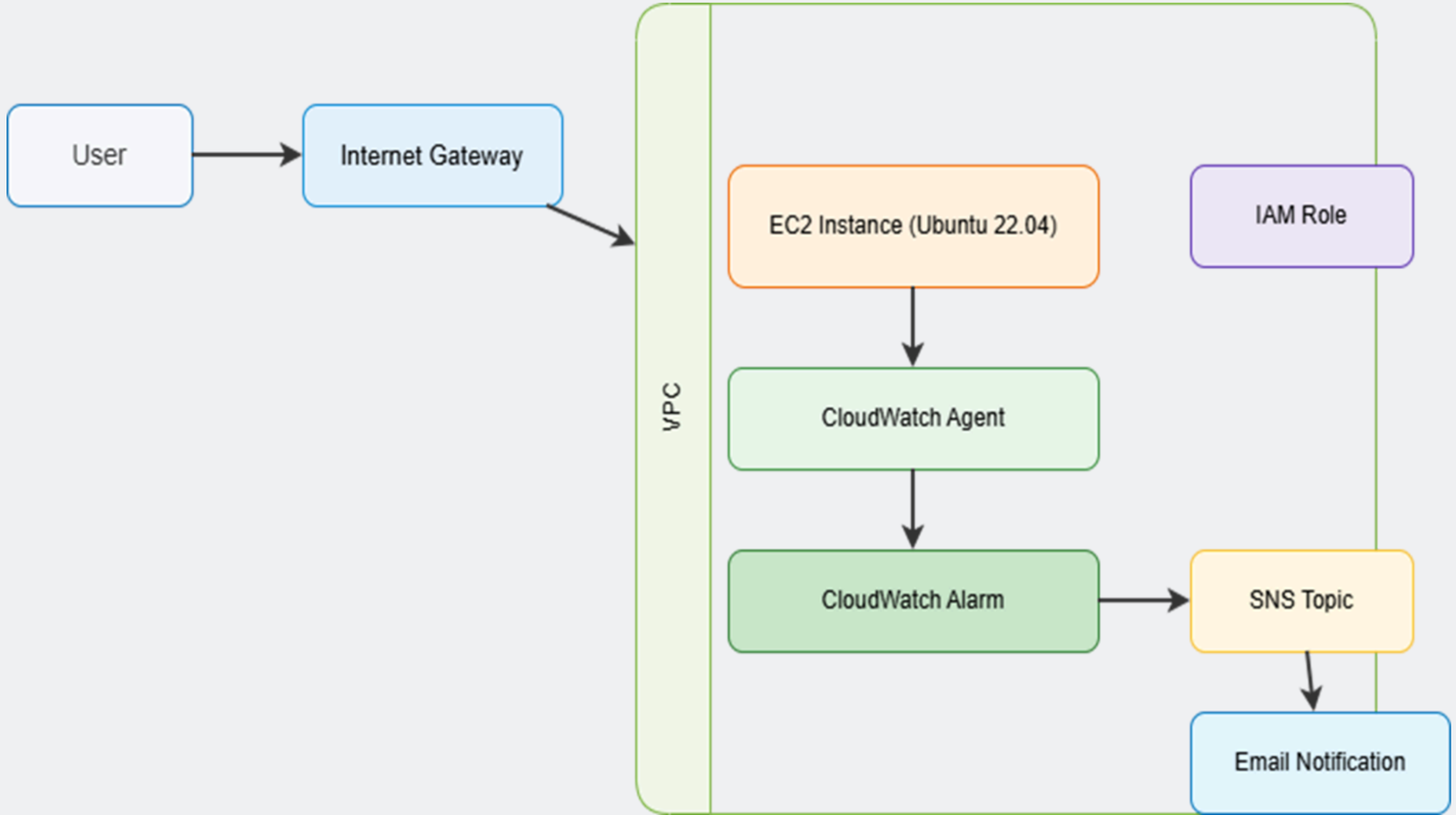
Conclusion

- A Full Stack ERP (ERB) System provides a complete digital solution by integrating technology, people, and processes.
- It helps organizations achieve efficiency, transparency, and digital transformation.

Core Infrastructure

- VPC Design: Custom VPC with 4 subnets (2 public, 2 private) across multiple AZs.
- EC2 Configuration: t3.large instance running Ubuntu 22.04 LTS.
- Performance Optimization: Unlimited CPU credits enabled via Terraform.
- Storage: 50 GiB gp3 EBS volume attached.
- Visuals: VPC Resource Map + EC2 Instance Summary screenshots.

Architecture Diagram



EC2 & VPC

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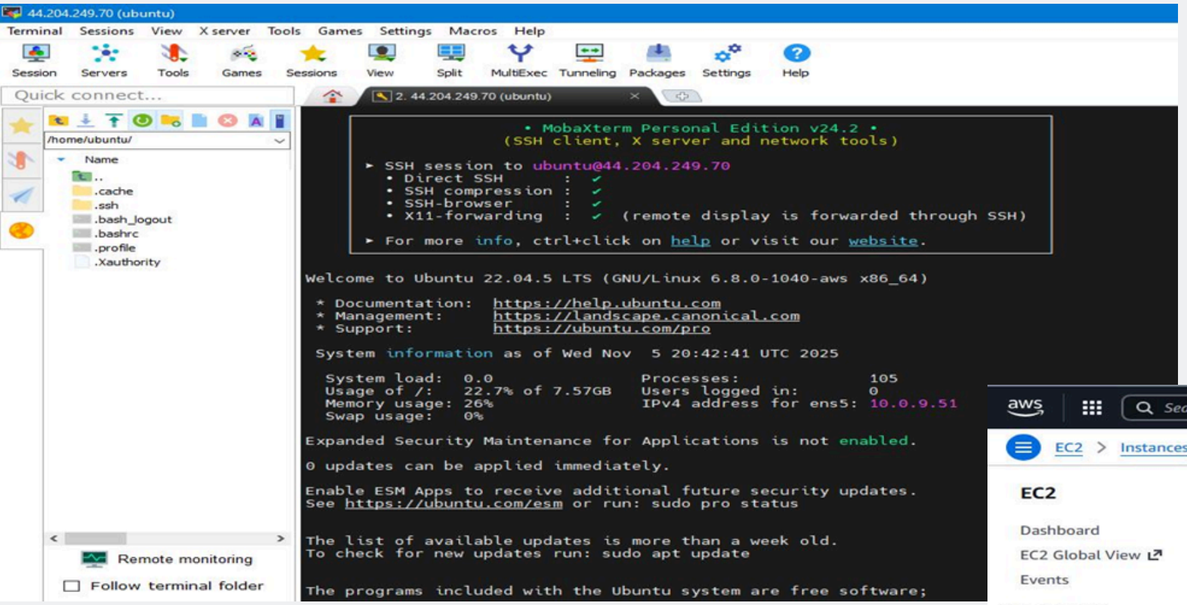
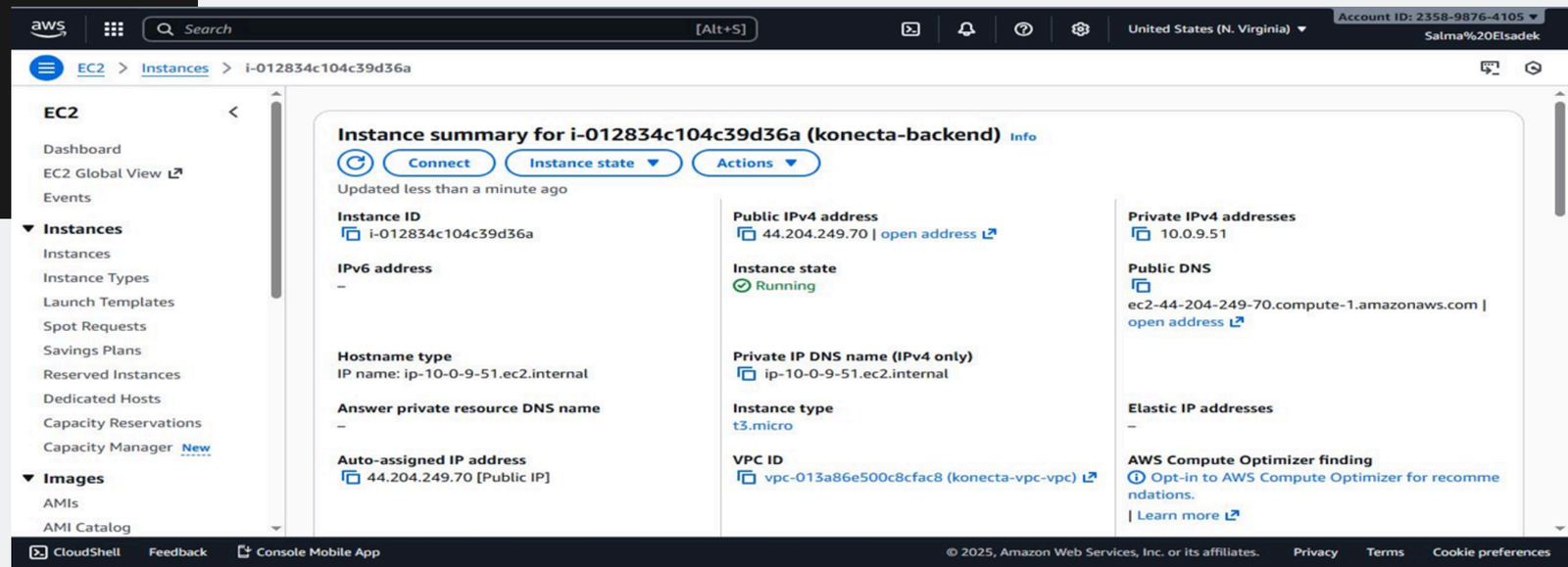




Problem Statement | HR | Finance | Full Stack | Cloud Computing

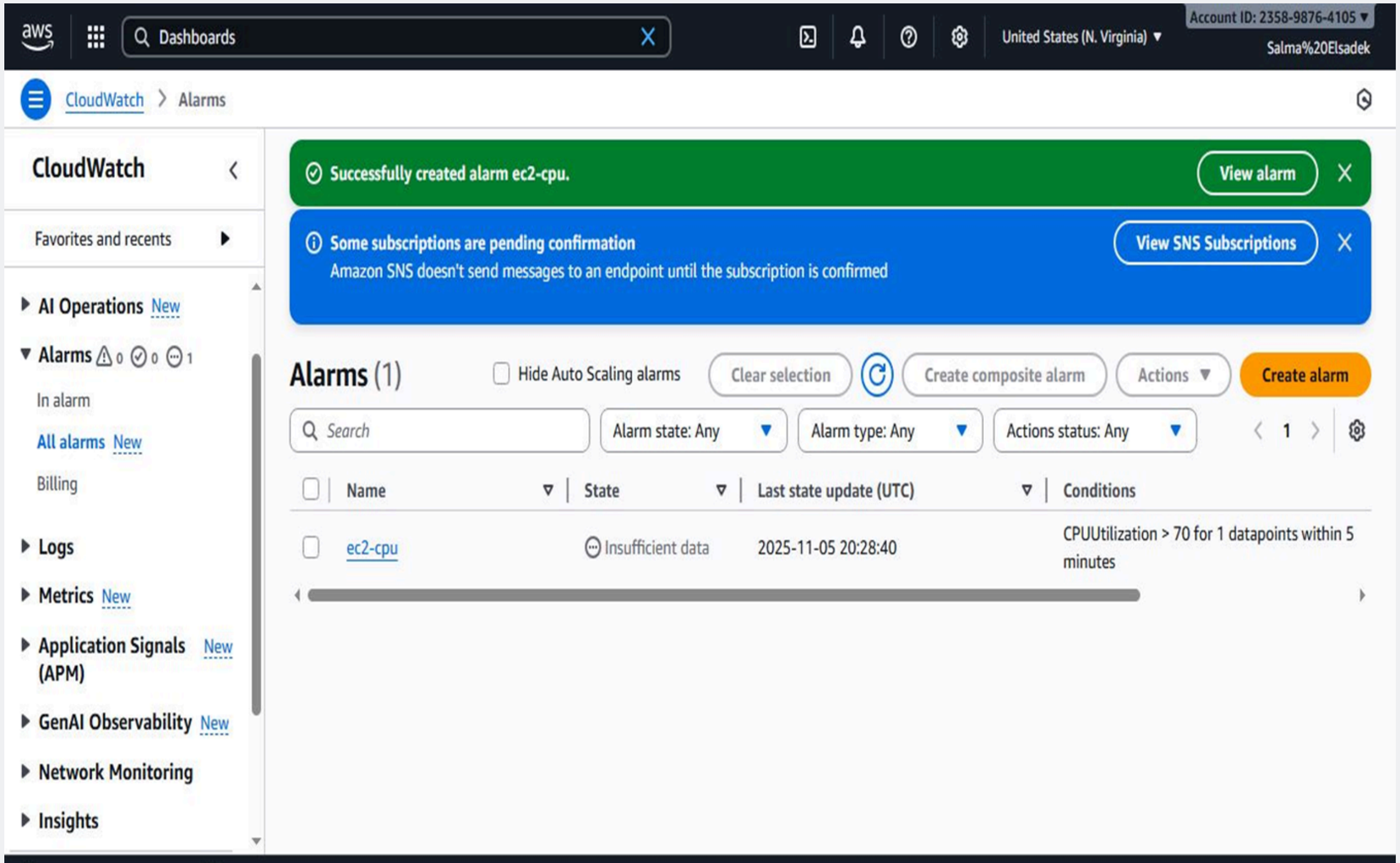
Insert your topic here

Monitoring & Alert

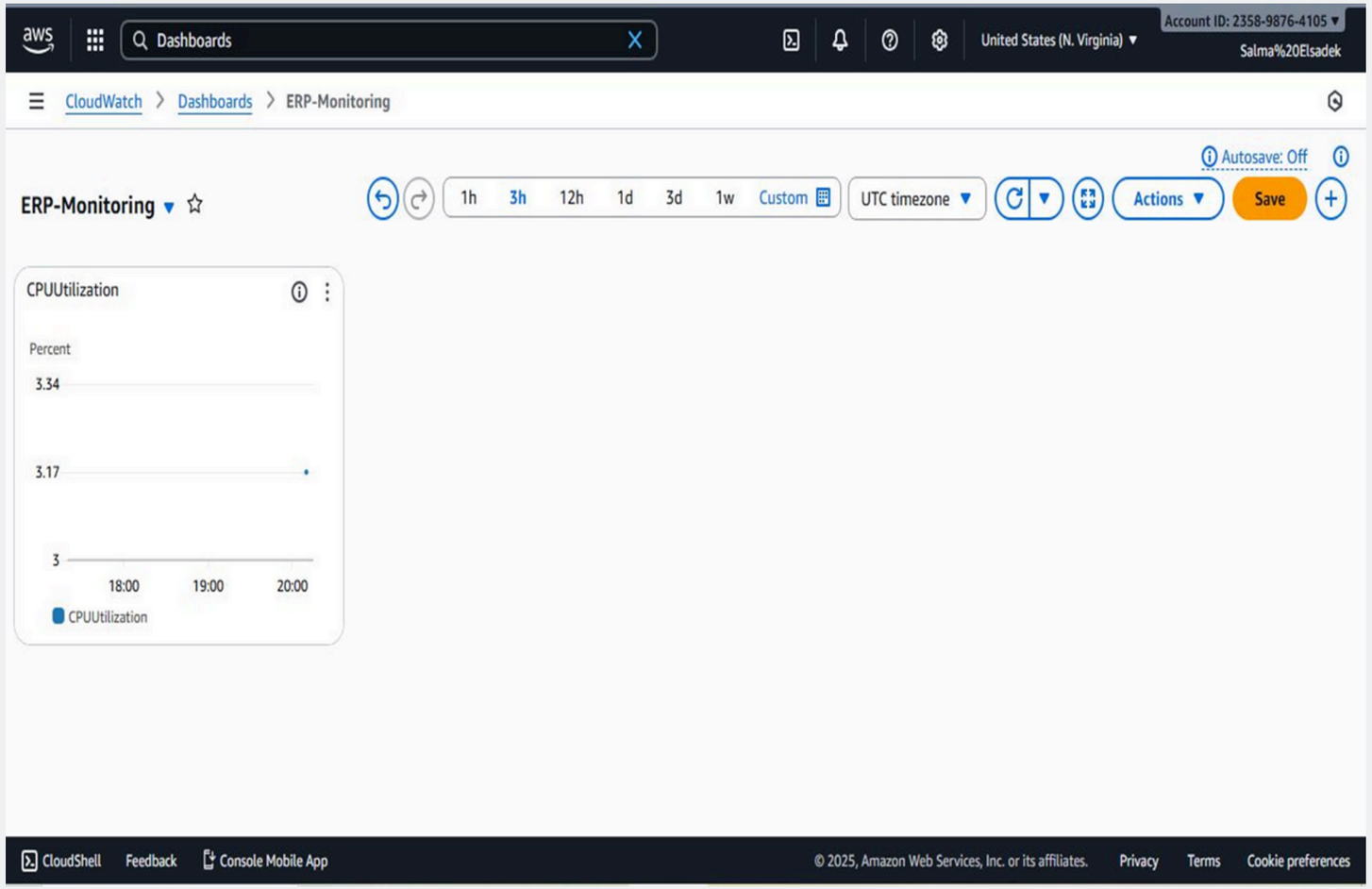
- CloudWatch Alarms: CPU utilization alarm triggered above 70%.
- Cost Management: Low CPU Credit Balance alarm configured.
- Incident Notification: SNS email alerts on alarm state changes.
- Real-time Visibility: CloudWatch dashboard for live monitoring.
- Visuals: CloudWatch Alarms list + Monitoring Dashboard graph.

Insert your topic here

Alarm



Cloud watch


aws
Dashboards
United States (N. Virginia)
Account ID: 2358-9876-4105
Salma%20Elsadek
CloudWatch > Dashboards > ERP-Monitoring
Autosave: Off
ERP-Monitoring
1h 3h 12h 1d 3d 1w Custom
UTC timezone
Actions
Save
CPUUtilization
Percent
3.34
3.17
3
18:00
19:00
20:00
CPUUtilization
CloudShell
Feedback
Console Mobile App
© 2025, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences

Security & Disaster Recovery (DR)

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- IAM Role: Instance Profile for secure access to S3 and CloudWatch.
- DR Strategy: Pilot Light (Warm Standby) in a secondary region.
- Data Protection: Daily automated snapshots with 7-day retention (DLM).
- Bucket Security: SSE-S3 encryption and Bucket Keys enabled.
- Visuals: Architecture diagram + S3 Bucket Properties screenshot.

S3 Bucket

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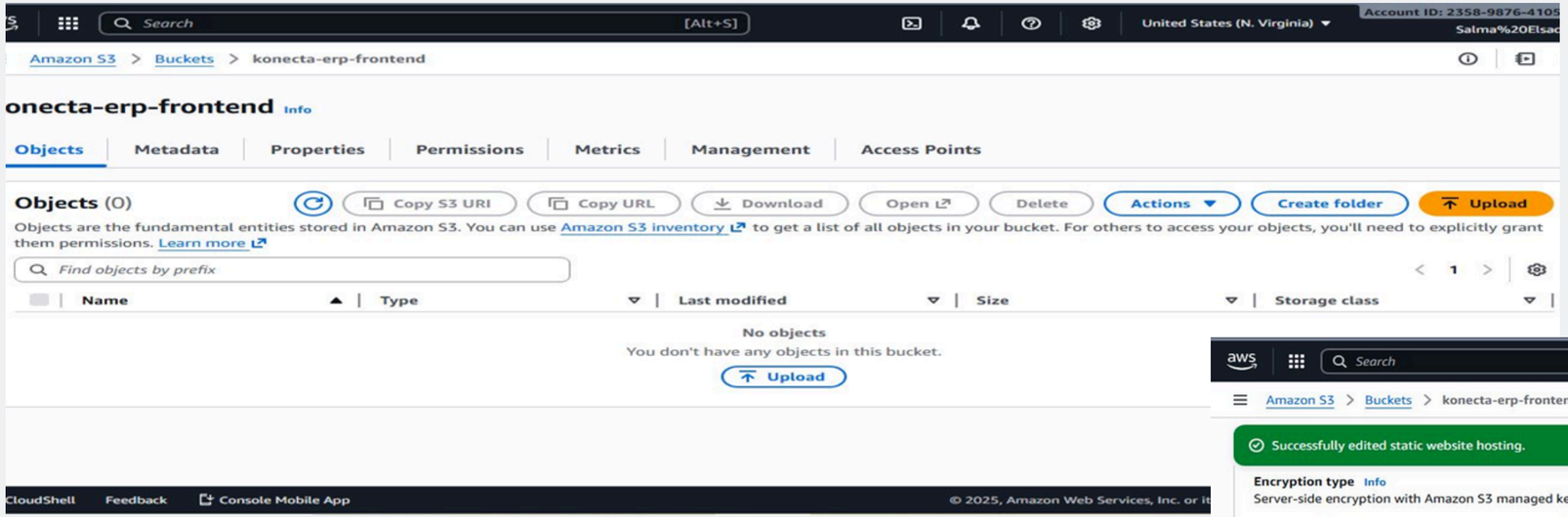

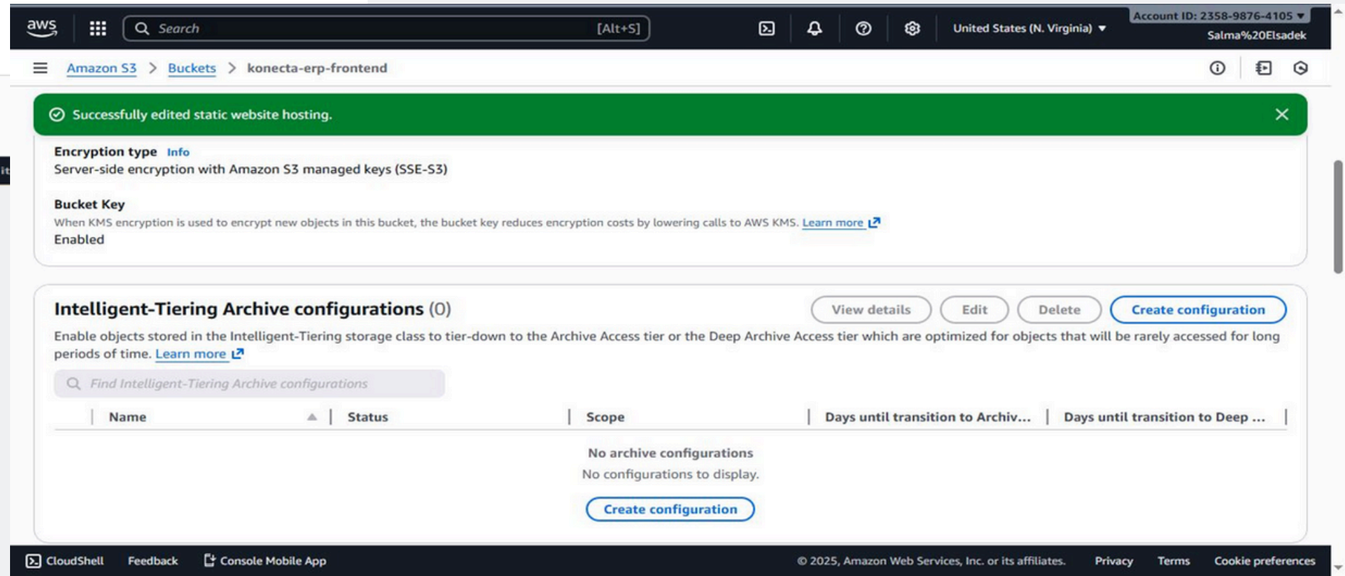

Problem Statement | HR | Finance | Full Stack | Cloud Computing

Insert your topic here

Infrastructure as Code (IaC) & Deployment

- Terraform: Entire infrastructure defined as code.
- Microservices Ready: S3 static frontend + ECS Fargate backend design.
- Remote Management: Secure SSH access using MobaXterm.
- Static Hosting: S3 static website hosting enabled.
- Visuals: MobaXterm terminal session + S3 hosting success banner.

SSH access

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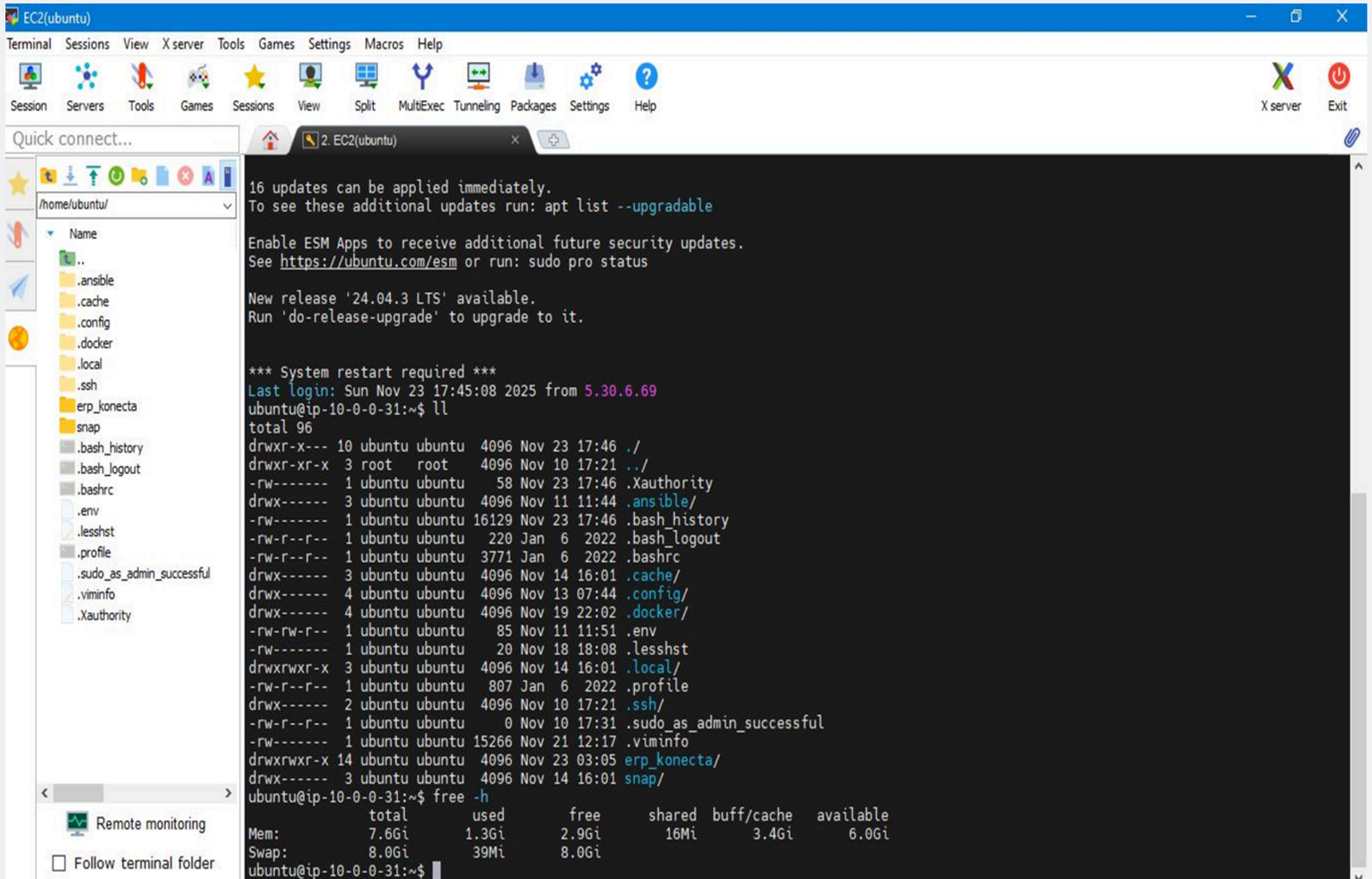

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Constraints & Financial Strategy

- Free Tier Navigation: t3.large and 50GB gp3 are outside Free Tier.
- Managed Services Deferral: RDS and ECS Fargate deferred to reduce costs.
- Replication Costs: Cross-region DR features incur extra charges.
- Future Roadmap: Scalable foundation for full managed microservices.

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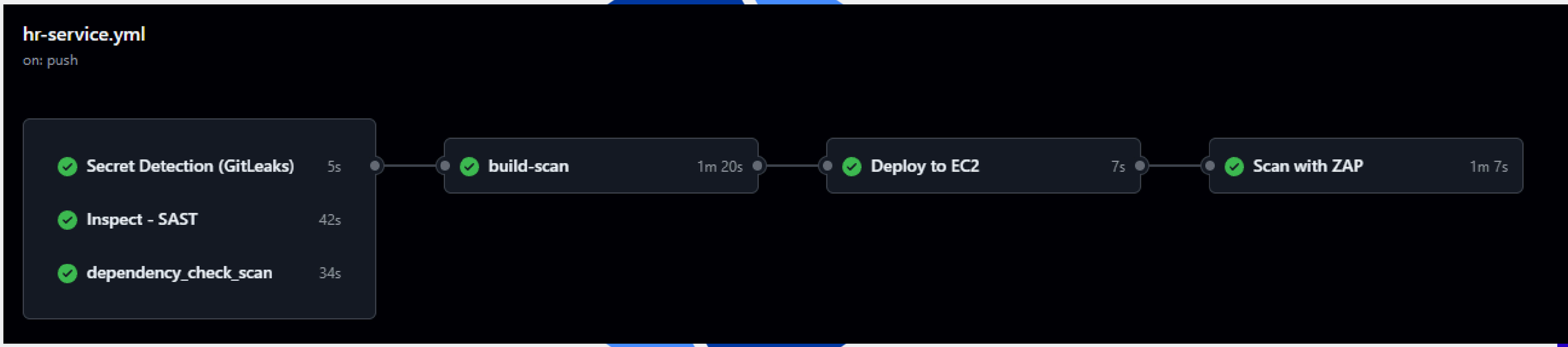
Why Shift Left?

The Problem	Our Approach	Impact
• Security Test Late. • A lot of Hotfixes. • Deployment deplays.	• Automated security. • DevSecOps Tools. • Instant feedback.	• Vulnerability remediation. • Faster deployments.

Pipeline

From Code to Production



Problem Statement | HR | Finance | Full Stack | Cloud Computing | DevOps

vulnerability Report

From Code to Production

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Code scanning

All tools are working as expected

Tools 2 + Add tool

is:open branch:main,ai-team-work

Clear current search query, filters, and sorts

60 Open ✓ 8 Closed

Language Tool Rule Severity Sort

PyTorch is a Python package that provides tensor computation with stro ... Critical Library ai-team-work
#13 opened on Nov 16 • Detected by Trivy in usr/.../torch-2.3.0+cpu.dist-inf.../METADATA :1

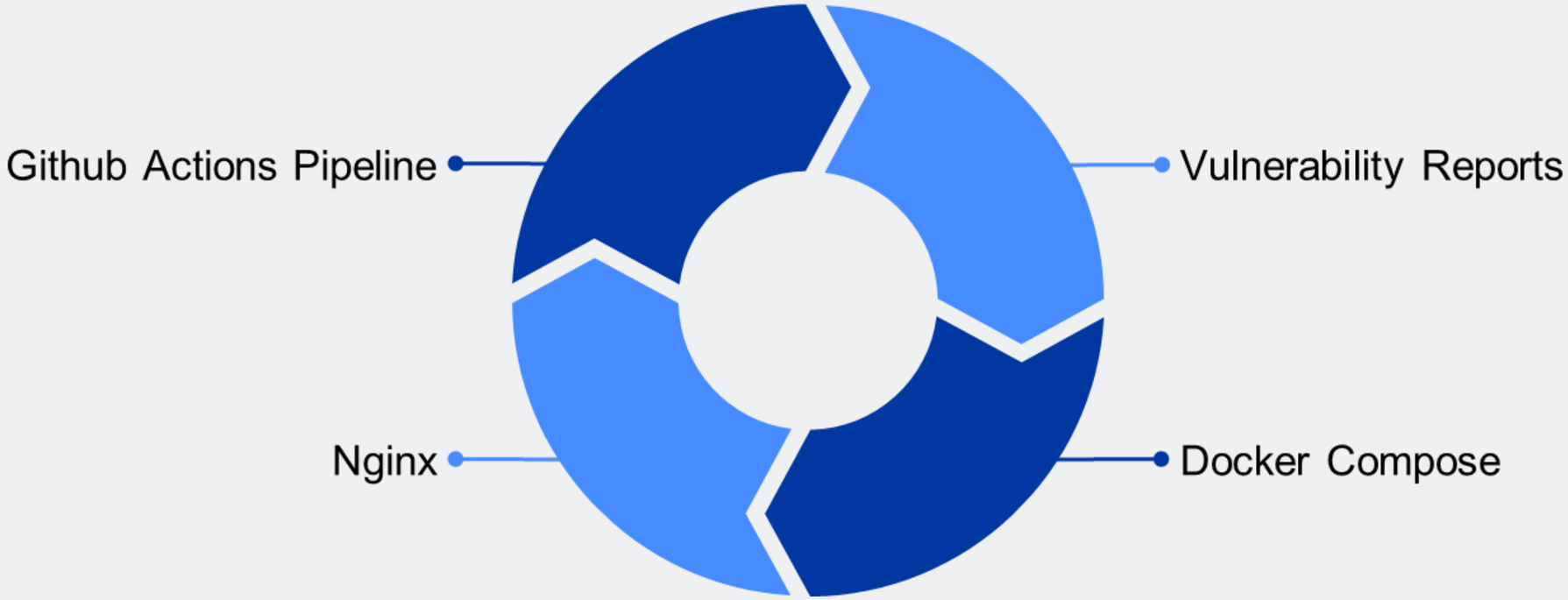
langchain-text-splitters: XXE Vulnerability in langchain-text-splitters High Library ai-team-work
#12 opened on Nov 16 • Detected by Trivy in app/.../langchain_text_splitters.../METADATA :1

critical severity - CVE-2022-4742 Improperly Controlled Modification of Object Prototype Attributes ('Prototype Pollution') vulnerability in pkg:pypi/jsonpointer@3.0.0 Critical ai-team-work
#68 opened on Nov 17 • Detected by dependency-check in file:/.../requirements.txt:jsonpoi.../3.0.0 :1

Problem Statement | HR | Finance | Full Stack | Cloud Computing | DevOps

vulnerability Report

From Code to Production



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Future Enhancements

Scalability

- EKS & KEDA
- ALB & ASG

Security & Monitoring

- Prometheus & Grafana
- Secrets Manager

Cybersecurity Assessment

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1. Project Status: Cloud Architecture & Initial Setup
2. Security Assessment: Infrastructure Gaps
3. Critical Findings: Penetration Test Results (SQLi, Data Exposure)
4. Risk & Impact: Conditional Approval Status
5. Remediation Roadmap: Immediate & Short-Term Fixes
6. Strategic Security: GRC Framework (NEW)

Week 2 Setup Summary

Week 2 Setup Summary:

Architecture: Microservices-ready layout deployed on AWS.

Network (VPC): Configured with 2 Public Subnets (Frontend access) and 2 Private Subnets (Backend/Database isolation).

Compute:

Backend: EC2 instance (Ubuntu 22.04, t2.micro) with restricted HTTP/SSH access.

Frontend: S3 bucket configured for static website hosting.

Operational Controls:

Monitoring: CloudWatch is active (CPU utilization alarms).

Cost: AWS Budgets configured with a $20 limit and 80% usage alerts.

Security Assessment

Positive Controls:

- Network isolation using subnets
- Restricted EC2 access (HTTP/SSH only)
- Active monitoring enabled

1. Security Gaps:No encryption (data at rest & in transit)

- Public S3 bucket access
- Weak IAM roles (no least privilege)
- No disaster recovery or backup strategy

HR Use Cases — Predictive & Generative AI

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Purpose: Predict employee attrition and training needs from HR data.

Models:
- Attrition: XGBoost (90% accuracy)
- Training needs: Logistic Regression (83% accuracy)

Explainability: SHAP (global drivers) and LIME (individual explanations).

GenAI: Gemini-generated, plain-English retention and training recommendations.

Deployment: FastAPI microservice on Hugging Face Spaces, integrated with ERP. (Live Demo)

HR Use Cases — CV Parsing & Candidate Ranking

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Purpose: Automated CV screening by measuring semantic match between JDs and CVs.

Models:

- Gemini-2.5-Flash (CV field extraction)
- Gemini Embeddings + cosine similarity (ranking)

Pipeline

Text Extraction → Structured Parsing (using Gemini LLM) → Creates Embedding for JD &CV → Computes cosine similarity & Ranking

(live demo)

Finance Use Cases — Classical Models

Purpose: Forecast Revenue, Expenses, and Cash Flow for ERP planning.
Data: **Quarterly** financial data (**40** quarters, 2015–2024).

Models Compared: **ARIMA**, **SARIMAX**, **Prophet**.
Validation:

- Lagged regressors to prevent **data leakage.**
- Backtesting on last **4 quarters** (Q1–Q4 2024).
- Evaluation using **MAE** and **RMSE**.

Final Model: Prophet — best balance of accuracy, robustness, and interpretability.

Deployment: Dockerized FastAPI service on Hugging Face Spaces (Live API).

Finance Use Cases — Deep Learning Models

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Data: 2000 rows, 30 columns

Models Tested: RNN, LSTM, Temporal Fusion Transformer (TFT).

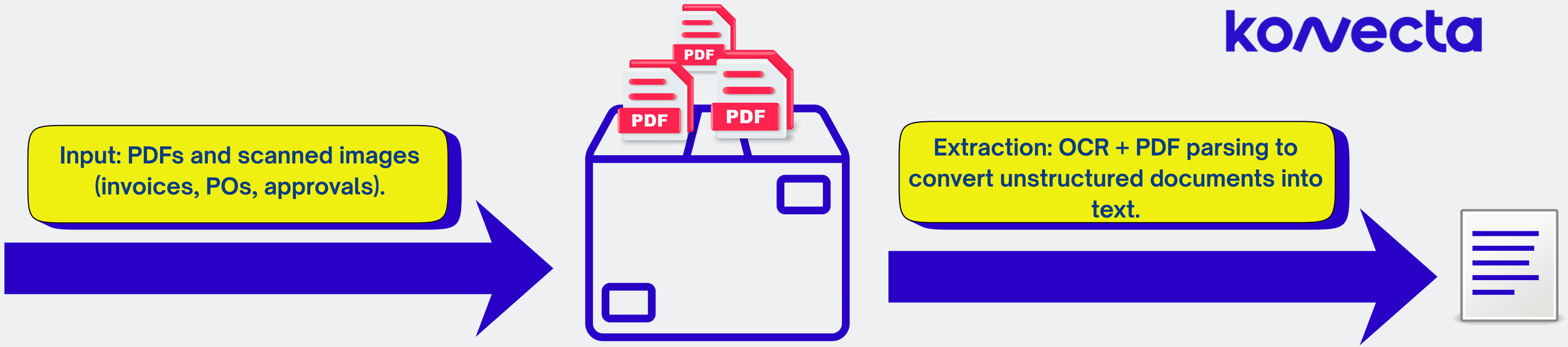
Final Model: TFT — handles multivariate financial and market signals.

Setup: 8 past quarters → 1-quarter ahead prediction.

Output: Forecasts + error metrics in ERP-ready JSON.

Deployment: FastAPI + Docker on Hugging Face Spaces (Live Demo).

Automated Document Processing Use Case



- **Classification:** LLM-based document type detection.
- **Structuring:** Key-value extraction into structured JSON.
- **Storage:** MongoDB with semantic embeddings for deduplication and search.
- **Deployment:** Deployed on Hugging Face Spaces (Live Demo).

ERP Chatbot (RAG + Generative AI) Use Case

Use Case: Natural-language Q&A over ERP invoices.

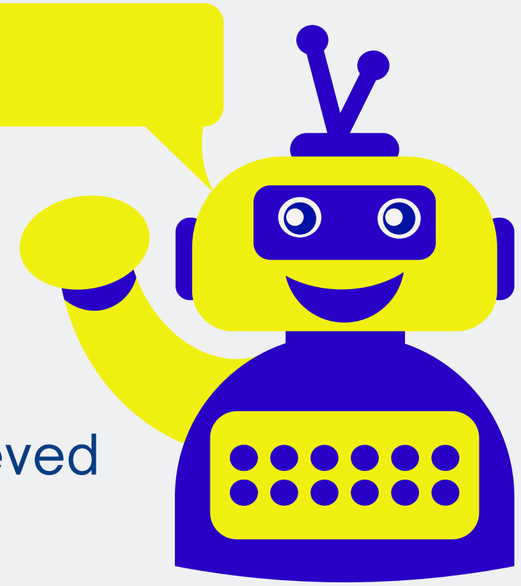
UI: Interactive chatbot interface for querying ERP documents.

Retrieval: Semantic search using sentence embeddings + MongoDB vector index.

Generation: Context-aware answers generated by an LLM using retrieved invoice data.

Result: Accurate, grounded responses with reduced hallucination risk.

Deployment: Deployed as a web application on Hugging Face Spaces (Live Demo).



Overview – The Nexus Transformation Phases

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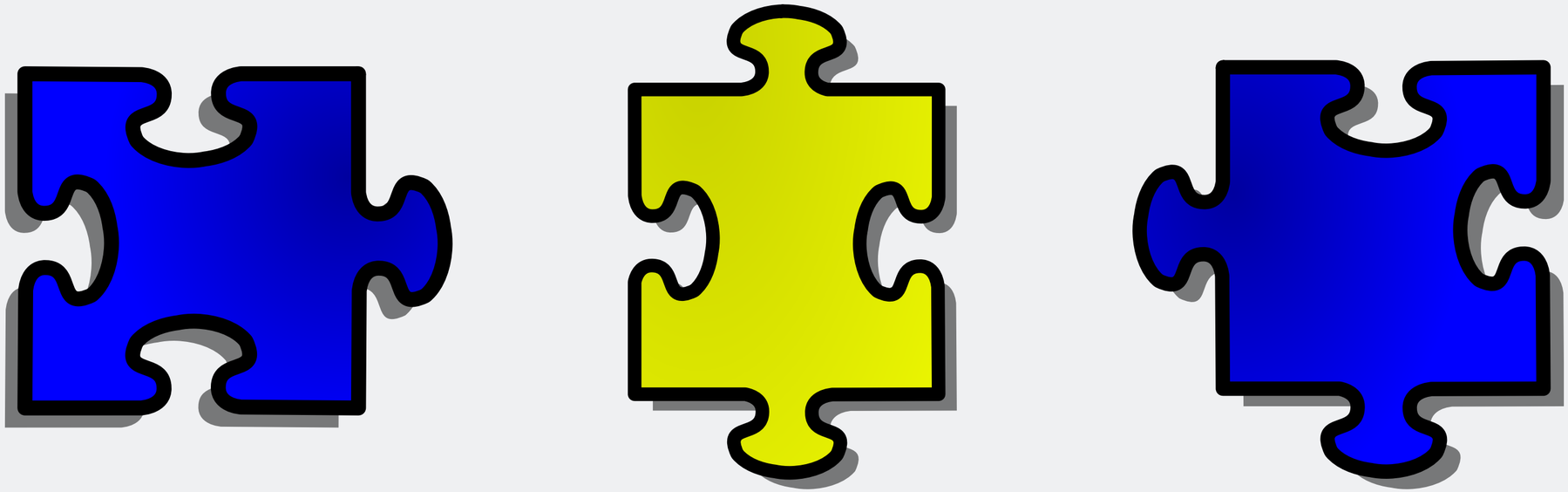
Preparation & Content Development



Strategy & Brand Identity

Campaign Rollout & Execution

Strategy & Brand Identity

Objective: Establishing the foundation for the ERP transition through research and creative design.

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Conducted interviews to align the ERP branding with organizational needs and business goals.

Designed the "Nexus" identity, including the logo, visual guidelines, and the "Get It Done" tagline. Branding

Drafted the initial awareness campaign and internal adoption communication plans to ensure 100% employee reach

Preparation & Content Development

Objective: Building the educational assets required to move employees from awareness to competency.

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Drafted technical training scripts and structured outlines for role-based onboarding videos.

Collaborated with HR to integrate change management planning, ensuring a smooth cultural shift.

Prepared high-quality training video scripts and comprehensive user guides for various departments.

Campaign Rollout & Execution

Objective: Driving engagement and system adoption through multi-channel communication.

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Created the teaser campaign and awareness emails to build anticipation and reduce resistance.

Rolled out the official ERP launch campaign, including final countdowns and executive announcements.

Established the "Improvement Suggestion Box" to capture real-time user insights.

Expected Outcomes

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1. A complete 10-week awareness strategy is finalized and ready for immediate implementation.
2. The internal narrative has successfully transitioned from resisting change to accepting the ERP as a beneficial tool.
3. All role-specific user training scripts and onboarding videos are produced and ready for deployment.
4. A full library of professional awareness emails and teaser content is prepared for the rollout.

Business Value

Business Value

Higher efficiency

Better data accuracy

Faster decision-making

Scalability & Security

Thank You

Thank You :)
Any questions?