#### **CAS Group – Our Journey of Innovation and Growth**

**1990** Founded CAS Trading – Laid the foundation of the CAS Group legacy. Widely recognized as a trusted local partner of HP and Finacle Core Banking

**2010** Launched First Data Center in Bhairahawa – Branded as OHM Datacenter

2014 Established Second Datacenter in Kathmandu – Expanded national reach Silver Lining – Introduced OpenStack Cloud with PCCW support

**2025** Building Third New State-of-the-Art Datacenter in Kamal Pokhari – Al-ready

#### The Datacenter Journey: From Virtual Machines to Cloud and AI

• Lessons from 25 Years of Experience



Presented by: Pradip Lamichhane Event: NPNOC-11

#### Jana Jagriti School Solukhumbu



#### Junbesi School – on the way to Everest



#### Junbesi School



#### That is the Mount Everest



# My background in datacenter and virtualization



# The Early Days of Datacenters

- Physical servers per application
- High costs, low efficiency
- Manual provisioning and maintenance



#### How datacenters have changed over the decades



#### Virtualization Era

- Introduction of VMware, Hyper-V, and KVM
- Benefits: Resource optimization, scalability, cost savings
- Challenges: Complexity, licensing, management

## The Shift to Datacenter and Cloud

 Rise of public and private clouds in local Datacenter as well as Digital Ocean, AWS, Azure, GCP, etc.

"According to government records, international companies generated \$12 million in business this year, and the government collected \$3 million in taxes. However, there might be a significant volume of **undocumented transactions**."

- On-demand resources, elasticity, global reach
- DevOps, containers, and automation

# Why Data Categorization Matters

#### **Requirement of Data Categorization**

- Helps classify data by type, sensitivity, and usage
- Enables effective data lifecycle management
- Supports analytics, compliance, and resource optimization

#### Data Sovereignty Based on Data Importance

- Critical data must stay within national/regional boundaries
- Ensures legal, policy, and customer compliance
- Local hosting for sensitive or high-risk information

#### **Datacenters Today**

- Hybrid and multi-cloud environments
- Emphasis on uptime, resilience, and performance

#### **Data Center Standardization**

Tier	Description	Redundancy Model	Availability	Downtime/Year
Tier I	Basic infrastructure, single path	Ν	~99.671%	~28.8 hours
Tier II	Redundant components	N+1	~99.741%	~22 hours
Tier III	Concurrently maintainable	N+1/2N	~99.982%	~1.6 hours
Tier IV	Fault-tolerant, dual-powered systems	2N / 2N+1	~99.995%	~26.3 minutes

#### Example (Power Backup)

•N = 2 UPS systems needed  $\rightarrow$  You install exactly 2

•N+1 = 2 needed  $\rightarrow$  You install 3 (1 extra for backup)

•2N = 2 needed → You install 4 (2 for live, 2 for backup)

•2N+1 = 2 needed  $\rightarrow$  You install 5 (2 active, 2 backup, 1 spare)

#### What's New vs Traditional Datacenter

Aspect	Traditional DC	Modern GPU DC	
Power per rack	5–10 kW	30–60 kW	
Cooling	Air (CRAC units)	Liquid, immersion, in-row	
Networking	10-40G	100–400G, Infiniband	
Server Density	Moderate	Very high (multi-GPU per server)	
Storage	SAN/NAS	NVMe, object, parallel FS	
AI Workloads	Limited	Core design purpose	

#### Net-Zen Datacenter

"Net-Zen" = Network + Zen

"Net" = Networks, Datacenters, Cloud infrastructure
"Zen" = Calm, simplicity, mindfulness, balance

- Predictable, scalable, and calm operations
- Human-free zone: intelligent monitoring & self-healing systems
- Green energy, minimal footprint

#### Net-Zen Datacenter

#### Wet-Zen Datacenter Principles

Element	Traditional DC	Net-Zen DC
Operations	Manual, reactive	Automated, predictive
Workload Management	Static provisioning	Dynamic, Al-driven allocation
Cooling/Power	High energy consumption	Liquid cooling, green energy
Monitoring	Human-in-the-loop	Self-monitoring, AlOps
Design	Hardware-first	Workload-first, software-defined
Growth	Scale-out with complexity	Scale-out with harmony

## **Rethinking Infrastructure**

- Liquid cooling, high-density racks
- Automation with AI/ML (AlOps)
- Energy efficiency and sustainability

# Virtualization, Cloud, AI Workloads

- Demand for GPUs and high-performance computing
- Use cases: Machine learning, video processing, analytics



# Key Applications of GPU Servers in Nepal

- Optical Character Recognition (OCR)
- Intelligent Character Recognition (ICR)
- AI-Powered Chatbots
- Loan processing
- KYC (Know Your Customer) automation.
- Fraud Detection & Risk Analysis
- Algorithmic Trading & Market Predictions
- Cybersecurity & Threat Detection

# Nepal's Opportunity

- Leapfrogging to modern infrastructure
- Government support and local innovation
- Building regional hubs for cloud and AI

## Key Takeaways

- Datacenters must evolve for modern workloads
- Virtualization was just the beginning
- Al, automation, and sustainability are the future
- Predictable, scalable, and calm operations
- Make Three "M" simplex, not complex.

- Mo Mo
- Motorcycle
- Mayalu

Make IT operations simple, not complex."

#### Management, Monitoring, and Maintenance

#### Thank You